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EDITED BY

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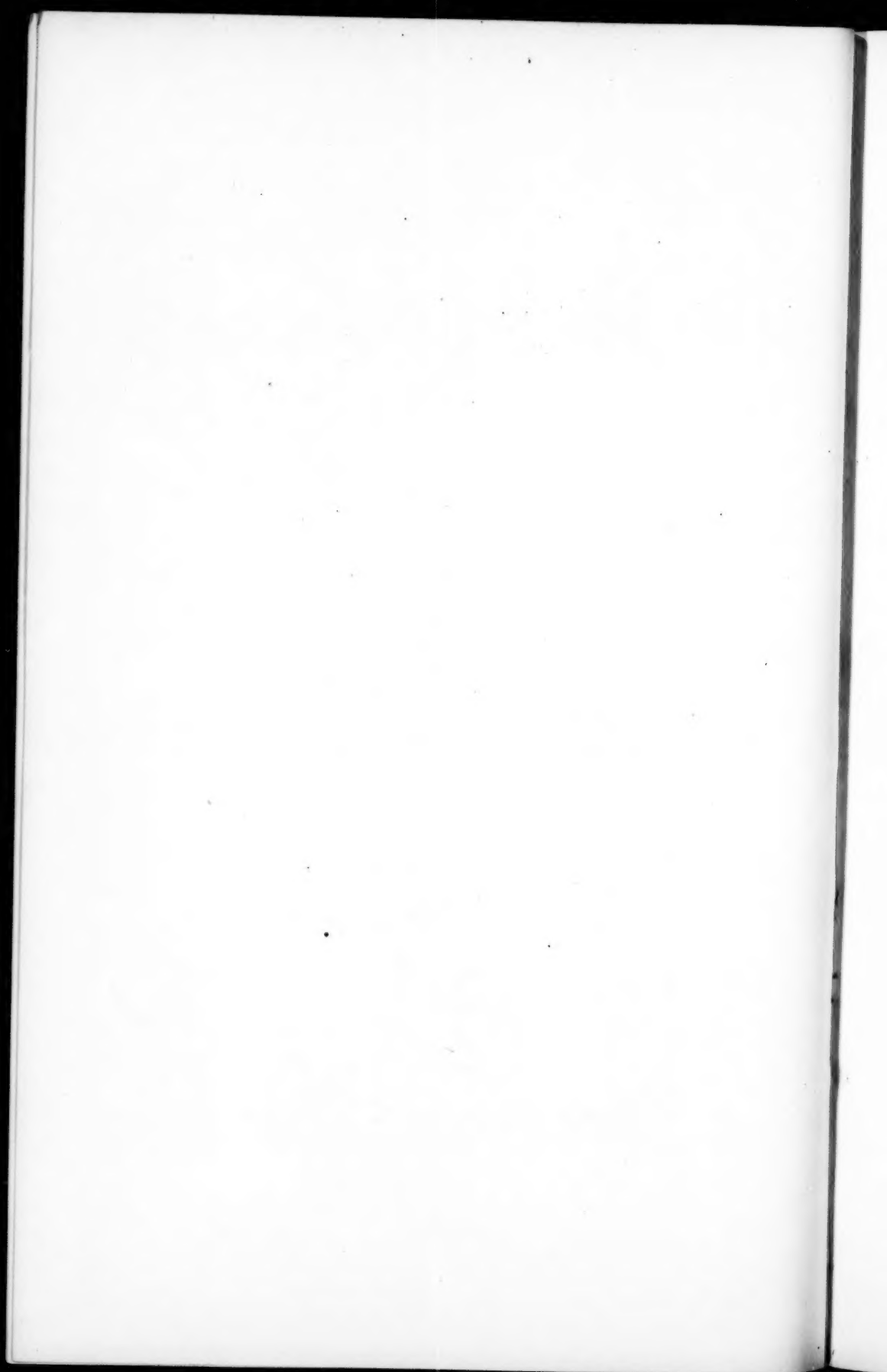
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ANNALS OF SURGERY.

UNILATERAL HYPERTROPHY OF THE GUMS, AS- SOCIATED WITH OTHER ABNORMALITIES, CHIEFLY HYPERTROPHIC AND UNILATERAL.

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ROSANNAH ALLINGTON, æt. 12, from Isleham, a rather pale, but healthy, well-made, intelligent girl, was admitted into Addenbrooke's Hospital in January, 1885, with great hypertrophy of the gums on the left side of the upper jaw, both internal and external to the teeth, but more particularly on the outer side, where was formed a coarsely lobulated mass, bulging the cheek and protruding between the lips. It affected the whole length of the gum as far forward as the left middle incisor tooth and extended as high as the reflection of the mucous membrane over the cheek, on the one side, and over the hard palate a little beyond the middle line on the other. It was about the usual consistence of gum, except at the fore part where it was softer, and resembled ordinary venous nævus. It projected between, and partially covered the teeth so that one bicuspid and one molar only could be seen.

On the right side, above, were two molars, two bicuspids, one canine and two incisors. The incisors were pressed towards the right by the abnormal growth.

In other respects these teeth and the gums were natural. In the lower jaw there were, on the right side, two molars, one bicuspid, two

incisors; on the left side two molars, one bicuspid, one canine and two incisors. The gums on the left side, below, were rather thicker than those on the right, and a hypertrophied prolongation from behind extended over the crowns of the left molars.

There was no difference in size between the corresponding teeth on the two sides, above or below, and no discoverable difference between the bones on the two sides of the face or head.

The left tonsil and side of the soft palate were somewhat larger than the right. The upper and lower lips, on the left side, protruded and somewhat everted by the growth over which they could not be closed, were rather thick and coarse.



FIG 1.—CASE OF UNILATERAL HYPERTROPHY OF GUMS.

This was the case also with the skin of the alæ of the nostrils, especially of the left, causing a slight deviation of the septum to the right. The hair on the head was thick and rather coarse. The vibrissæ in both nostrils were long. The left eyelids were somewhat larger, and the eyelashes decidedly larger and thicker than the right, though there was no increase in their number. The fold of skin above the left eyelid was larger than on the right side, which caused slight drooping of the lid.

The hairs of the eyebrow on the left side, were coarser, more numerous and extended more nearly to the median line than on the right, but there was no apparent difference between the eyes. The pinna of the

left ear was a quarter of an inch larger and a little thicker than that of the right.

This was most marked in the helix and the tragus. The hair of the scalp came down rather lower in front of the ear on the left side. The whole of the skin of the face was rather fuller on the left side than on the right, and was rather more covered with hair. The papillæ on the left side of the tongue were rather larger than those on the right.

The second digit on the left foot terminated in a soft, bulbous extremity of skin covering a cushion of fat; without trace of nail, and without apparently any terminal phalanx; it was a little shorter than the corresponding toe on the right foot. The right thumb ended in a similar soft bulb, but there was here a rudimentary nail in the form of a short, hard flake of epithelium, and the ungual phalanx could be felt.

There was a small (a quarter of an inch in diameter) brown mole on the palmar aspect of the right thumb, over the distal end of the metacarpal bone, and another over the carpal end; and on the instep of the left foot was a third mole, flat and of about the size of a farthing. All these moles were hairless.

On January 16th, having drawn the middle incisor tooth and made an incision through the cheek, I removed freely with a saw the whole of the left alveolar border, including a portion of the hard palate and the teeth, and cleared away with a Volkmann's spoon the hypertrophied mucosa which extended upon the right side of the hard palate, thus completely taking away the diseased structure from the upper jaw. There was a good deal of hæmorrhage, which was checked, partly by ligature and partly by cautery.

The child was very faint, but soon recovered. The wound healed quickly and she was discharged on February 7th.

October 3d, 1885. She came to the hospital that I might see her. There was no return whatever of the disease in the upper jaw, but the hypertrophy of the gums on the left side of the lower jaw had rather increased.

Her mother, who has a double upper lip (on both sides) but who is in other respects well-formed and is a very healthy woman, states that the upper gums in the child on the left side were observed to be larger at, or soon after, birth.

She attributes the condition to the fact of a mouse having sprung out of a flour bin which she was opening, and startled her when she was in an early stage of pregnancy with the child. Her belief, therefore, is that the affection is congenital.

The swelling had increased out of proportion to the growth of the

child, laterally more especially, and had produced so much deformity and inconvenience that she wished it to be removed.

The following microscopical report was made by my assistant, Mr. A. Francis, who also wrote the details of the case from which the foregoing has been chiefly taken.

The part of the growth at the posterior alveolar edge consisted of coarse trabeculae of fibrous tissue, running in various directions, with staff-shaped nuclei here and there, indicating the position of the connective tissue corpuscles.

The deeper part of the growth was very dense with a slight amount of vascularity. The superficial part was more vascular, of looser texture, and with more numerous connective tissue corpuscles. The growth was covered by very hypertrophied, simple and branched papillae, rather vascular and cellular. Epithelium not excessive: there was a well-marked stratum lucidum on the surface, which was smooth. The texture of the palatine growth was looser, with smaller trabeculae, and was more vascular with abundant fat-cells, blood-vessels, and connective tissue corpuscles, but with less marked hypertrophy of superficial papillae.

The following are abstracts of the accounts of ten cases of this disease, which I have found recorded:

(1.) GROSS. *System of Surgery*. Sixth edition. Vol. II. P. 431.

Lad, æt. 10, stunted development, ill-shaped head, large abdomen, feeble intellect. Gums of both jaws largely affected. Removal by scalpels and scaling instruments, several times repeated. Growing again four years afterwards.

(2.) POLLOCK'S case. *Holmes' System of Surgery*. Third edition. Vol. 2, p. 457.

Girl, æt. 8. Epileptic. One tooth cut two weeks after birth and six within five weeks. Gums thin, face thick and puffy. Unusual quantity of hair from birth on head, arms and legs. When aged 2, the gums were cauterized and temporary teeth extracted. Gums of both jaws appeared largely protruding from the mouth, and alveolar processes expanded and prolonged. Portions of projecting mass cut away with scalpels and bone-nippers, repeated as the patient could bear it, till alveolar borders were curtailed within moderate limits. Some tendency to return subsequently, but Mr. Salter (*Dental Pathology and Surgery*, p. 195) says that after a few months it grew no more. A fibrous mass with enormously long papillae and very thick epithelium.

(3.) ERICHSEN. *Heath's Diseases of Jaws*. Third edition. P. 127.

Girl, æt. 2 $\frac{1}{2}$. Incisor gums of both jaws and teeth hypertrophied,

began at 7 months. Exuberant growth removed and teeth extracted. A fibrous mass with enlarged papillæ and thick epithelium. Disease progressed, and when seen by Dr. Murray (*Medical and Chirurgical Transactions*. Vol. 6, p. 138) æt. 7, affected the gums everywhere. Soft, flattened tumors in skin of forehead, nose, axillæ, and arms, legs, and feet. Elevations, like smooth warts, on back, and sides of neck. Hypertrophied, nodular conditions of ends of fingers (except left forefinger) and thumbs of both hands and of third and fourth toes of both feet. Nails also large and furrowed. The right forefinger less affected than the others, Ecchymosed appearance over scapulæ, buttocks and backs of thighs. Small exostosis on each tibia. Deaf, but intelligent and in good health. The peculiar condition of fingers and neck not noticed till she was two years old, the tumors on head a year afterwards, fresh ones appearing at various periods.

Microscopical examination showed the tumors to belong to the connective tissue group, developing into fibrous tissue and cartilage.

(4.) Dr. MURRAY (*loc. cit.*) Brother of No. 3, æt. 3 years, 9 months. Had gums like No. 3, but affected to a greater extent; observed when 3 months old.

Tonsils enlarged and deep cervical glands. Bottle nose with bluish discoloration. Patches of thick, glistening skin on cheek, eyelid and neck. End of right middle forefinger enlarged and hard. Noticed recently. Small warty growth on dorsum of finger. In good health, but sullen, stubborn, and rarely makes attempts to speak.

(5.) Dr. MURRAY (*loc. cit.*). Sister of 3 and 4, æt. 2. Swelling of gums, and warty patch on skin at back of neck, observed when 2 months old, increasing; and skin at back of ear and, more recently, at junction of nose and left cheek, had become the seat of growth. Slight rachitis, but otherwise good health, and intelligent. Mr. Jonathan Hutchinson, Dr. Robert Liveing, and Dr. Tilbury Fox examined these three patients and argued that their affections ought to be placed in the family group of *molluscum fibrosum*.

The three children were born under unfavorable hygienic conditions, the eldest boy born under more favorable conditions, though from infancy living with the rest of the family, quite healthy. The fifth child, an infant, born in another and better house, was healthy, but with *nævi materni* on sides of face.

(6.) MACGILLIVRAY (*Australian Medical Journal*. August, 1885. P. 240). Woman, æt. 29. Two teeth appeared at 12 months, no other after that. The affection was in both jaws from birth, mainly from the palatal portion of the gums. At æt. 10, parts of gums cut

away above and below, and nine teeth extracted at nine operations. Severe hæmorrhage, checked by cautery. Hypertrophied gums, and alveolar processes which were enlarged in fore part of lower jaw removed with success, nine operations being required. Disease consisted of increased development of gums and papillæ.

(7.) HEATH (*Injuries and Diseases of the Jaws*. Third edition. P. 230). Girl, æt. 4 $\frac{1}{2}$. Hypertrophy of gums equal in both jaws, began two years ago by the side of the temporary molars which were just coming through. Epileptic with good health, one of five children. Others healthy. Hypertrophied gums and alveolar margins removed successfully,

(8.) HEATH (*loc. cit.*, p. 231); Man, æt. 26, affection of right side of lower jaw from early childhood. Removed with affected alveolus.

(9.) WATERMAN. *Boston Medical and Surgical Journal*. April 8, 1869. Female, æt. 27, of average mental capacity, never good health. Affection said not to have been congenital, but commenced early in life. Repeatedly had abscesses and gum-boils, gums of both jaws hypertrophied, chiefly in front, involving and overhanging the palate. Teeth had been extracted at various times. Twenty-six teeth extracted, and parts of gums overhanging palate removed. Six months after whole of outgrowth removed and dental border of superior maxilla sawn off. Under microscope a purely fibrous growth.

(10.) WATERMAN adds to preceding account. "A very remarkable specimen of this disease presented itself in the person of a female of feeble intellect covered with a remarkable hairy growth, who was exhibited by a showman in this city (Boston) ten years ago under the name of the Bear Woman. The hypertrophy of the gums was greater than in the recorded case."

(It will be observed that nine of the eleven, including my own, above recorded cases were females.)

The disease appears to be a simple, but spreading hypertrophy of the gum-tissue, differing therefore from epulis, which is an affection of a similar kind of the fibrous tissue of the alveolar processes and tooth sockets. It is congenital, or commences in very early life, perhaps at the time of the cutting of the first teeth.

It commonly involves the entire gums of both jaws, on both the buccal and the palatal sides; in No. 6 it was most marked on the palatal side, but it usually attains the maximum near the opening of the mouth where the restraining influence of

external pressure is least. In No. 2 and also in No. 6 the alveolar processes are said to have been involved in the disease; and in No. 3 the teeth also are stated to have been hypertrophied, which is not mentioned to have occurred in any of the other cases. Complete removal by knife or cautery is required, and to do this effectually it is commonly necessary to take away more or less of the alveolar processes with bone forceps or saw.

In its general pathological character, as a congenital, local and spreading hypertrophy, it is allied to nævus, and some moles; but an additional curious and interesting feature is the frequency of its association with certain other abnormal conditions. Nos. 1, 4 and 10 were of feeble intellect, No. 1 being also stunted, with ill-shaped head and large abdomen. Nos. 2 and 7 were epileptic. No. 3 was deaf. No. 5 was slightly rachitic with warty patches on skin of head and neck. In Nos. 2 and 10, and the case I have given, there was unusual development—a hypertrophic condition—of the hair on the head, and in No. 2 on the arms and legs also. And in Nos. 3 and 4 there was a hypertrophied nodular condition of the ends of the fingers and various abnormalities of the skin and subcutaneous tissue.

My case is further remarkable in that it was unilateral, affecting the gums of the left side of the upper jaw much, and of the lower jaw slightly, and was associated with hyperdevelopment on the same side of the soft palate, tonsil, lips, alæ nasi, eyelids, pinna of the ear and of hair of the head, eyebrow and eyelids, and of the left side of the face generally; also of the papillæ of the tongue on the left side. Although the hypertrophies on the head and face were thus, with the exception of some enlargement of the right ala nasi, confined to the left side, the abnormalities of the digits which were of the nature of deficiency or atrophy, rather than of excess, and the moles were shared by the extremities of both sides.

NOTE.—Billroth, *Clinical Surgery*, New Sydenham Society, p. 53, mentions a case of unilateral congenital hypertrophy of the mucous membrane of the cheek and the upper surface of the tongue, combined with cavernous lymphangiectasis in a lad æt. 10. Dr. Friedrich, *Virchow's Archiv*, XXVIII, 474, gives a case of congenital unilateral hypertrophy of the head (right side) in a young woman. The right side of the tongue was larger than the left, and with coarser papillæ; and there was greater

growth of hair on that side. In the *Journal of Anatomy and Physiology*, IV, 1868, 226, I gave a short account of asymmetry in a young woman, the entire right side (head, trunk, tongue, palate and limbs) being larger than the left; and Dr. Isambard Owen showed me the other day a similar condition in a young woman under his care in St. George's Hospital; See *Lancet*. Oct. 31, 1885, p. 808, where report of this case is given. The *Archives G n rales de M decine*, 1869, 11. 536, contains a paper on unilateral hypertrophy of the body, partial or total, in which twelve cases (seven in males, five in females) are collected. They include Friedrich's case above mentioned, but not that published by me in 1868.

REMARKS ON EXCISION OF THE HIP.¹

By LEROY MILTON YALE, M. D.,

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AN apology is perhaps due to the society for again bringing up so well-worn a subject as excision of the hip. But, as it is one upon which surgical opinion is far from unanimous, its consideration must be always in order until the value of the operation is better settled than it yet is. The more recent views concerning tubercle and the rise of antiseptic surgery have stimulated the resort to excision in hip disease. Aseptic methods have now been long enough employed for considerable experience to have been accumulated as to their effect upon the ultimate results of the operation. This paper is the outcome of an attempt to ascertain from the periodical literature of the last six or seven years what this experience has been, and whether any conclusions could be drawn from it regarding the indications for resection in hip disease. Although tolerably familiar with the difficulties of the question, I confess I was somewhat surprised at the scantiness of the material which came to hand that was valuable for exact comparisons.

The grounds upon which resection of the hip is urged as preferable to non-interference are usually three:

1. That it directly saves life.

¹ Read before the New York Surgical Society, November 10, 1885.

2. That it shortens treatment, and, by so doing, lessens risks both vital and functional.

3. That it gives better functional results.

There can be no manner of doubt that the operation often saves lives that otherwise must certainly have been sacrificed. Such operations *in extremis* have been aptly compared to tracheotomy in like condition. Under such circumstances failures should not be counted. Every success should be esteemed a clear gain, and even prolongation of life and mitigation of suffering be reckoned in favor of the operation. About such resections there is probably no question. The inquiry is rather this: Comparing cases as nearly as possible similar, at what period, or under what circumstances, do the results obtained by excision become preferable to those gained by less radical measures? And it may be here remarked that a good deal that has been said regarding the relative value of early or late operations is rather beside the question, for there is little doubt as to their comparative success. The issue is between the operation at all and conservative methods, and the former is clearly indicated whenever it can be shown to give better prospects for life than the latter.

The value to be set upon resection, therefore, depends very largely upon what is held to be the natural tendency of the disease, and upon what success can be gained by conservative treatment. And right here, at the start, we find a divergence of views so wide as to go far toward explaining the unsettled condition of opinion regarding the operation. The most gloomy statements come from German authors. Thus Billroth gave the death-rate of his cases, some of which were followed after leaving the hospital, at $31\frac{1}{4}$ per cent, taking, if I understand correctly, all cases. Hueter,¹ from hospital records alone, gave $26\frac{3}{4}$ per cent. The two lists united give $28\frac{2}{3}$ per cent. Nowhere else is the death rate set so high when all stages of the disease are considered together. From reports for several years of the Orthopædic Hospital of this city, I find that the deaths and discharges on account of incurability together make an annual average of about $4\frac{3}{4}$ per cent of

¹ "Klinik der Gelenkrankheiten. S. 142.

all cases treated. Gibney's¹ statistics from the Hospital for the Ruptured and Crippled give for 288 cases a mortality from all causes of $12\frac{1}{2}$ per cent. Taylor's² statistics, which give (deducting one case of violent death) 2 deaths in 93 cases, or $2\frac{1}{6}$ per cent, can not be fairly quoted here, as they were drawn from a private practice among well-to-do people.

Although exsection has of late been done quite early in the disease, yet it would be obviously unfair to make any comparison between the death-rate of these collections of cases in all stages and the most favorable operative statistics. Again, although exsection is frequently done when destructive changes are recognizable in the joint, but before suppuration is evident, I know of no extended statistics of the corresponding cases treated conservatively. A few cases will be mentioned further on. But, regarding suppurative coxitis, we have more distinct expressions of the results of experience, and some statistics. Here, again, Hueter's estimates exceed others in gravity. While acknowledging the absence of exact information, he states that he should be surprised if statistics should show that more than 50 per cent of cases that reach the "second florescence stage" (the stage of flexion, adduction and inward rotation) ever were healed. And he further states his belief that "suppuration of the hip joint—if the cases in which a single small abscess forms and quickly closes again, and also the cases of scanty suppuration in the granulations of synovitis hyperplastica granulosa are subtracted—is a nearly absolutely fatal process."³ Volkmann⁴ is by no means so hopeless. Ollier⁵ thinks that "the greater part of the suppurative coxalgias of children may be cured by methodical expectation, aided by the resources of hygiene." Taylor lost 2 out of 24 suppurative cases, or $8\frac{1}{3}$ per cent. This, as before stated, was in private practice. The committee of the Clinical Society of London⁶ set the mortality of cases of sup-

¹The Strumous Element in the Ætiology of Joint Disease, *New York Medical Journal*, July and August, 1877.

²Observations on the Mechanical Treatment of Diseases of the Hip Joint, *Boston Med. and Surg. Jour.*, March 6, 1879, p. 318.

³*L. c.*, p. 641.

⁴Resectionen der Gelenke, *Samml. klin. Vortr.*, No. 51, p. 2.

⁵*Revue de chirurgie*, 1881.

⁶*Transactions*, 1881.

purative hip disease, treated expectantly, at $33\frac{1}{2}$ per cent from all causes; or, leaving out causes unconnected with the disease, at $3\frac{1}{6}$ per cent. Cazin¹ gives the result in the cases of 80 patients treated at the hospital at Berck, sent from a Parisian hospital after they had failed to improve there. All but ten of these were grave cases, and 5 per cent were already albuminuric when received. The statistics cover five years; 55 per cent were cured, $12\frac{1}{2}$ per cent died, $7\frac{1}{2}$ per cent were benefited, and the remaining 25 per cent were not cured when removed. This remarkable success for cases of such severity may, perhaps, be not fairly introduced here, as the patients, although belonging to the hospital class, were at Berck under excellent hygienic influence, and were systematically treated.

Gibney,² out of 80 patients with hip disease cured without mechanical treatment, found 48 that had had abscesses. No percentage of mortality can be made here, as the total number having had abscesses that were treated is unknown; but this number of recoveries under a plan of the purest expectancy shows that suppurative coxitis can not be nearly so grave an accident as some have estimated it to be. As an offset, however, may be mentioned 19 patients recorded by Caumont,³ treated conservatively, of whom 12 (63.1 per cent) died.

From these discordant figures and opinions it seems to me fair to conclude that their disparity is not the result of the bias of different observers, but that in some communities or districts circumstances may so influence the course of the disease as to make an actual difference in the facts, as well as in the interpretation of them. To express an opinion, therefore, as to the average mortality of suppurative coxitis may be hazardous, or even presumptuous. Nevertheless, my own observations lead me to accept the more moderate estimates as the more nearly correct, and I should consider that the rate set in the Clinical Society's report was amply large; that is to say, that the death-rate would not exceed 30 per cent, even among the poor, at least as we know poverty in this great city. In

¹ *Bulletin et mémoires de la société de chirurgie*, Paris, 1876.

² *Medical Record*, vol. xiii, p. 174.

³ *Deutsche Ztschr. f. klin. Chirurgie*, Bd. xx, S. 137.

private conversations, Dr. Gibney and Dr. Shaffer, of this city, both of whom have had unusual facilities for knowing the results of hip disease among the poor, expressed the opinion that the estimate I have given was very liberal, and would considerably exceed the facts.

Now, as to the death-rate of excision. Leisrink's often-quoted tables set it at 63.6 per cent,¹ but this high figure is reached by setting aside all unhealed cases as worthless, which is a source of error, as many such cases go through the same course as unoperated cases and reach an ultimate cure, perhaps by ankylosis, after a long time. If all of Leisrink's cases had been included, his death-rate would have been 57.9 per cent. Sayre's² table gives 72 cases (two being still under treatment), with 25 deaths, or 34.7 per cent. Culbertson's tables contain 418 cases, with 174 deaths, or 41.62 per cent. If uncertain cases, 30 in number, are excluded, the percentage will be 44.84. All these collections contain cases observed for quite a long time, and this death-rate is by no means that of operation. Culbertson gives only 29 deaths as immediately resulting from the operation—that is, 6.93 per cent of all cases. This is interesting as showing that even before the advent of antiseptic surgery the operation, as such, added but little to the general mortality from hip disease.

Many lists published since the beginning of antiseptic surgery contain cases treated in both periods, and often no attempt is made to separate them. Thus, Cowell,³ in reporting 65 operations of his own, says: "I now perform the operation antiseptically," but the results are all grouped together. It does not appear that these cases were followed beyond the hospital. There were seven deaths among them, or 10.77 per cent. Three patients above 18 years of age, all died. Of the 62 below 18 years, only 4 died, or 6.15 per cent. Here should be placed the statistics of the Clinical Society's report, before quoted, which gave a mortality of 40 per cent, or, excluding deaths from causes unconnected with the disease, 37.7 per cent. Holmes'⁴ list—given in his well-known Address in

¹ Langenbeck's *Arch. f. klin. Chirurgie*, Bd. xii, S. 177.

² *Orthopaedic Surgery*, 2d ed. p. 347.

³ *British Med. Journal*, 1882, ii 360.

⁴ *Ibid*, 1880, ii, 212.

Surgery—of operations done in British hospitals belongs to the five years ending 1878, a period during which antiseptic precautions were coming into use. They should probably be considered as mixed operations. It does not appear how long the cases were followed, but, of 215 cases, 40, or 18.6 per cent, ended fatally, and 57, or 26.5 per cent, failed. Caumont,¹ whose statistics are commendable for the care with which patients have been traced for years after they left the hospital and carefully classified, records 42 cases, with 26 deaths, 61.9 per cent. Only 5, or 11.9 per cent, died from the operation. The remaining 50 per cent were from progressive caries, amyloid changes, and tuberculosis. His death-rate before antiseptics was 66 per cent; since antiseptics, 41 per cent.

Of operations entirely antiseptic, Volkmann² reports 48 with but 4 deaths, or $8\frac{1}{3}$ per cent. Two only of these (from shock) were strictly deaths from operation; the third, after two months, was from thrombosis, and the fourth, after three months and a quarter, from hæmorrhage from ulceration of an artery, due to a suppurating scrofulous gland. Volkmann estimates that 8 or 10 would subsequently prove fatal from the progress of the disease, which would run up the death-rate to 25 or 30 per cent. Korff³ reports 16 deaths out of 33 cases treated antiseptically (48.48 per cent), the death-rate diminishing steadily as the methods were improved, being 75 per cent when Lister only was used, 52.63 per cent with a modified Lister, and 30 per cent with a bichloride and salt gauze dressing. Grosch⁴ bases his statistics on 166 cases treated antiseptically; 120 of these were observed to the end, with 44 deaths, or 36.7 per cent. He divides his cases into three stages. The first contains those operated on with unruptured capsule and slight changes in the joint; the second, cases with abscess and fistulæ; the third, cases with long suppuration, extensive destruction of the joint with great debilitation. In the first class there was for children no death-rate; for the second, it was 24.1 per cent; for the third, 67.5 per cent. Fur-

¹ *Deutsche Zeitung f. Chirurgie*, Bd. xx, 1883, Heft 3 and 4

² *Verhandl. d. deutsch. Gesellsch. f. Chirurgie*, 1877, S. 59.

³ *Deutsche Ztschr. f. Chirurgie*, Bd. xxii. S. 149.

⁴ Inaugural Dissertation, Dorpat, 1882, Abstract in *Centralbl. f. Chirurgie*, 1882, S. 228.

ther, he found that for the period 1876-82, after antiseptic methods were well established, the death-rate was 9 per cent less than for the period 1870-75, in which these methods were forming. Quite recently Alexander¹ gives the results of 36 operations apparently all done and dressed antiseptically (chloride of zinc and Lister). One patient only died of operation (shock), 2.77 per cent; 10 more from disease. Total death-rate, 30.55 per cent.

It will at once be seen that statistics gathered in such different ways, and to bring out different aspects of the question, can not be closely compared with hope of an exact result. But, if I have correctly apprehended the general import, it is this: that the mortality after resection of the hip joint has materially diminished since the introduction of antiseptic precautions, and that the diminution corresponds very closely to the death-rate formerly chargeable immediately to the operation itself. Take the extensive tables of Culbertson; setting aside uncertain cases, he had a total death-rate of 44.84 per cent; deducting deaths from operation—6.93 per cent—we have 37.91 per cent, which is very nearly the same as Grosch's 36.7 per cent for 120 completed cases under antiseptic treatment. In other words, asepsis has almost abolished the risks from wound complications, and the death-rate is reduced very nearly to that from the uninterrupted disease when the operation has failed to arrest it.² And, as it has been shown that, in cases that heal, the period of healing is shorter than when antiseptics are not used, the danger of amyloid changes may be slightly lessened. Thus much has been gained by perfect antisepsis; in weighing the chances in any given case, we need no longer put much stress on the dangers of the operation itself, except, perhaps, the one element of shock, which the prolonged extirpation of diseased and suspected tissues, necessitated by the thoroughness of modern surgery, sometimes favors. It seems then, fair to say that whenever the disease in its natural course assumes an aspect threatening to life,

¹ *Liverpool Med.-Chir. Journal*. 1885, p. 289.

² At first sight it would seem as if more had been accomplished, but, as Grosch's statistics contain only early cases of a kind that scarcely appear in Culbertson's, the comparison is not quite upon an equal basis.

resection is indicated, provided none of the less radical operations—drainage, gouging, etc.—can remove the danger.

It has just been mentioned that very early operations, done while the changes in the joint are slight and the capsule unruptured, have given no death-rate, or almost none. But, on the other hand, the disease itself has practically no death-rate at this stage. Occasionally general or visceral tuberculosis may occur thus early, but rarely. Amyloid changes and exhaustion do not enter here as causes of death. It does not appear, then, that there is thus early any vital indication for excision. The early operation has been urged as vitally indicated in forestalling tuberculosis and the other attendant risks of morbus coxarius by cutting short the disease. If it could be proved that such prevention actually followed the operation it would be a weighty argument. As Grosch points out, tuberculosis is still the commonest cause of death. König¹ maintains, as a result of a large experience in excision of all kinds—117 in three years and a half—that the hope for immunity from tubercular infection has not been gained by antiseptic resection. Of 25 deaths after his operations, 18 were from tuberculosis, and in addition nine patients, not yet dead, were hopelessly tuberculous; in all, 21.5 per cent of his cases; and of 21 hip excisions, 10—47.6 per cent—died of tuberculosis in four years. In the debate on König's paper some disagreement with his views was expressed, but Esmarch essentially confirmed them. Caumont² distinctly states that he found no preventive effect in his cases. Of 26 cases of scrofulous origin treated by expectancy, he lost 5—rather less than one-fifth—from tubercular disease; of 12 resected he lost 4, or one-third. Others may have had better results, but the prophylactic effect can not be very decided if such marked exceptions occur.

Nor is it clear that destructive changes in the joint without evident suppuration often present a vital indication for excision. A vicious form of caries, characterized by great suffering and great destructiveness of tissues without much pus formation (caries sicca) is probably best met by resection. But of

¹ Ueber die Resultate der Gelenkresektionen, etc., *Verhandl. der deutsch. Gesellschaft. f. Chirurgie, IX. Kongress*; also, *Die Frühresection bei tuberculoſer Erkrankung der Gelenke*, etc., *Archiv. f. klin. Chirurgie*, Bd. xxvi, S. 822.

² *Loc. cit.*

ordinary caries this is not true. It is a matter of common experience to find cases in which the destructive process is evidenced by the misplacement of the trochanter, which go through the whole course to recovery without any external evidence of suppuration. Caumont has taken the trouble to place such cases by themselves in his report. Of those treated expectantly, 25 per cent died; of those exsected, 50 per cent.

It is not until suppuration has taken place that any vital indication for resection appears. Even here I believe the dictum of Hueter¹ is far too sweeping when he says: "I hold resection of the hip joint in coxitis to be indicated as soon as an extensive suppuration of the joint manifests itself, or as soon as the course shows that the termination in suppuration can be no longer prevented." Such a statement, however, is the natural outcome of his extremely gloomy views of the results of suppuration. If the opinion I have expressed as to the prognosis of suppurative coxalgia is anywhere near a correct one, resection is only indicated in a minority of cases. The indication comes not from the existence, but from the persistence, of suppuration. If it persists after the drainage of the abscesses and under the best hygienic resources the patient can command, particularly if fever attends the suppuration, then exploration of the joint is indicated, by incision or dilatation of existing fistulæ, with resection or a less extensive extirpation of the diseased parts, as the condition found may demand. And this should not be delayed after the system shows distinct depression from the suppurative process. To wait until the operation is the only escape from impending death is to err on the side of ultra-conservatism. I have not mentioned necrosis or sequestra in the joint, because under such circumstances some operation for the removal of the dead bone is imperative. Likewise, if perforation of the acetabulum with pelvic abscess exists, we have no resource but resection. True dislocation of the femur with suppuration of the hip joint is of very rare occurrence in ordinary hip disease, and the indication for excision often urged in this connection is rather orthopædic than vital.

L. c., p. 653.

A few words may be said regarding the second claim, that, namely, resection shortens the period of treatment, and that it diminishes the risks, both vital and functional. This is true of those cases that heal promptly and soundly, but only of such. Besides those that are fatal there is a long series of cases in which the patients neither die nor heal, but live years with persistent fistulæ. In Leisrink's tables 12.5 per cent were "unhealed;" in Holmes', 26.5 per cent were "failures." Such cases now are often spoken of as "relapses." Asepsis favors prompt healing of the soft parts, but the union subsequently in many cases breaks down, and the old process is re-established under circumstances in no way improved. Just how frequent these "relapses" are I can not say, but they are often mentioned as "common." My own observations make them about 20 per cent of all cases operated on. A friend who was in Kiel the past summer quotes Neuber as saying that "about half" of his cases relapsed. This refers, I understand, to the reopening of the wound, with tubercular granulations of its edges. Many of these ultimately do well after excision of the diseased parts.

Lastly, as to function. It is far from proved that resection gives better average results than a "natural" cure. In the question shortening is not the most important element. The shortening from resection is on the average greater than from natural cure, but not so very much. In a case not resected, but of such severity as to bring the operation into consideration, the growth of bone from the upper extremity will have been considerably retarded or arrested, according to the degree in which the epiphyseal cartilage has been affected. In a case resected the growth will be entirely abolished, and some bone already produced must be sacrificed. Ollier¹ points out that, although the total growth in length from the lower extremity of the femur amounts to about twice that from the upper, yet during the first four years of life the two ends contribute about equally, and that afterward the lower increases in activity until its work is, toward the end, about three times that of the upper. The prognosis as to

¹ *Revue de chirurgie*, 1881.

length, then, will vary with the age at which excision is done, very early excision giving much the greatest ultimate shortening. The leaving of the greater trochanter does not much affect this relation, for what it contributes to growth in length is mainly above the joint and does not much increase the efficient length of the bone. The atrophy from inactivity affects the whole limb, and is not materially different in cases resected from those left alone. If a resection was promptly successful the advantage ought to be in favor of the operation, as permitting more speedy use of the limb.

Again, a useful joint in a lower extremity must be stable as well as mobile. And for most occupations security in the support of the trunk is more essential than motion at any one joint. Mobility with security at the hip after excision is only obtainable when very strong fibrinous attachments exist between the pelvis and the remainder of the femur. The destruction from the disease and the necessary extirpation of affected tissues usually prevent the formation of attachments at once strong and flexible. Exceptions occasionally occur, and some very brilliant results have been obtained in which stability existed with very free motion.¹ Some very remarkable attempts at renovation of a hip joint have occurred, and interesting specimens have been described.² Nevertheless, as a rule, the motion, if considerable, is combined with such feebleness of support that the femur rides up and down on the pelvis in the act of walking. "Flail-joint," in the usual acceptation of the term as meaning uncontrollable motion in various directions, is rare, and I do not remember to have seen it. It is this insecurity that has led some operators (Ollier, Caumont) to urge that, if the operation is made very late, or in cases where much local damage has been done, if the patient must earn his living, it is better to strive for ankylosis rather than mobility. *A fortiori*, the ankylosis of a natural cure, the limb on the average being longer than after excision, will give for such persons a more useful limb. The compensating mobility of the spinal articulations, if the disease oc-

¹ See, for example, several cases figured in Sayre's *Orthopædic Surgery*.

² Sayre's *l.c.* frontispiece, 2d ed.; Küster, *Archiv f. klin. Chirurgie*, Bd. xxix, 409; Israel, *Ibid.*, p. 411.

curs in childhood, is often marvellous. The most striking instance I ever saw is No. 31 in Dr. Sayre's tables of excision; the motion took place in the lumbar spine, not only antero-posteriorly, but laterally, through a wide arc. Statistics (Grosch) show no better functional results for antiseptic operation than was formerly obtained. Functional reasons strengthen the indication for the substitution, whenever possible, of the simple extirpation of diseased tissues for formal excision in that they disturb less the relations of parts. These less radical performances are by the perfection of aseptic precautions rendered safe, and the large removals of bone formerly necessary to prevent accumulations of pus and septic matter seem no longer essential. In the same direction improvement of functional results may be hoped for by the employment in proper cases of the operative manœuvres in which a partial or temporary removal of the trochanter only is resorted to, the muscular attachments being little disturbed.¹

Further, it should not be forgotten that functional results as to position and motion can only be obtained by prolonged after-treatment. Neglect in this particular constantly produces great deformity, and the care required to secure these good results quite answers the claim already alluded to—that resection is a short road to cure.

The conclusion, then, to which the foregoing brings us is, that exsection of the hip is indicated as a life-saving operation only; and that, as it has not been shown that it can save from any dangers except those consequent upon prolonged suppuration, it is, with rare exceptions, only indicated when the suppurative process has evidently reached a dangerous point, and can not be interrupted by any less serious operation.

¹Ollier, *l. c.* König, *Centralbl. f. Chirurgie*, 1882, S. 457; Neuber, *Ibid*, 1884, Beilage, S. 75.

ON UNILATERAL EXTIRPATION OF THE LARYNX; WITH REPORT OF A CURED CASE.¹

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IT seems that opportunities for the successful unilateral extirpation of the larynx are rare.

Since 1878, when Billroth first demonstrated the feasibility of this procedure, only nineteen cases have been reported in medical literature; twenty, if we include the case under consideration. During this period the total extirpation of the organ was performed more than ninety times.²

Considering the brevity of this period, and the unavoidably incomplete histories of many of the cases, it must be admitted that to form conclusive deductions would be impossible at present.

But a sketch of the salient features of the subject would not be premature, and will, in the main, consist of true outlines.

A study of the subjoined twenty cases gathered from Solis-Cohen³ and Billroth⁴ will lead to following conclusions:

1. The rate of mortality after the partial excision is 20%, whereas that observed after total extirpation is 33 to the hundred. This refers to the cases of death directly due to the operation.

2. Complete cure, that is freedom from recurrence of the removed cancer or sarcoma, *together with a perfect or nearly per-*

¹ Paper read before and patient presented to the Med. Chir. Soc'y of New York, Nov. 2, 1885.

² Solis-Cohen in *Ashhurst's Encyclopedia of Surgery*, Vol V, p. 757.

³ *Loc. cit.*

⁴ Fritz Salzer, Larynxoperationen in der Klinik Billroth, 1870-1884. *Archiv. für klin. Chirurgie.* Vol. XXXI, p. 862.

fect preservation of the voice and deglutition, is possible and has been achieved in a remarkable number of cases. Certainly, the tendency to recurrence is not larger than after total extirpation.

3. With a very few exceptions the external wound could be closed permanently, and the use of a tracheal canula was not needed for respiration, as was invariably the case after total extirpation.

4. The power of deglutition was, in the main, well preserved in all cases except one.

In this, the operation was done for intractable cicatricial stenosis of the pharynx and larynx.

The history of the case in question is as follows :

H. O., æt. 57, porter, of good family history, had been suffering since five months of a rebellious hoarseness and steadily increasing painful deglutition. The latter trouble was much aggravated by a very irritating cough. Marked loss of power and emaciation had followed since the appearance of a lump under the left ear.

Dr. I. W. Gleitsmann kindly presented the patient to me March 8, 1885, when the following points were noted: On a heavy frame were seen shrunken muscles and wasted adipose tissue, the skin was flabby and slightly jaundiced: on each cheek a hectic red patch was seen. The thoracic and abdominal organs were normal. In the left submaxillary triangle, immediately behind the angle of the jaw, a deep-seated, nearly immovable, hard, glandular swelling, of the size of a hen's egg, was observed. On endolaryngeal inspection the presence of a smooth pale tumor was ascertained. The new growth had the size and shape of an almond. It commenced in the left glosso-epiglottidian fold, extended through the substance of the left vocal cord into the ary-epiglottidian fold, and ended in the arytenoid cartilage with a knoblike protuberance.

In consideration of the glandular swelling and of the circumstance that the good-sized tumor had not yet ulcerated, it was deemed plausible to diagnose a sarcoma, and the patient was advised to submit to unilateral extirpation of the larynx. He was admitted to the German Hospital March 16, and two days later, chloroform being administered, the infiltrated glands were removed, and preliminary inferior tracheotomy was performed. The sterno-mastoid was found partly involved, likewise a portion of the internal jugular vein. A part of the former and a piece of about $1\frac{1}{2}$ inches in length of the vein were removed in

one piece with the glandular tumor. The upper ligature, securing the vein, was applied close to the base of the cranium. The ends of the severed sterno-mastoid muscle were reunited by a number of catgut sutures, and two drainage tubes having been placed in the angles of the wound, the cutaneous incision was also closed. Duration of the operations was two hours.

The healing of the wound progressed correctly under antiseptic dressing, but deep mental depression was observed to materially interfere with the general welfare of the patient. Though no fever appeared, he visibly failed on account of dejection and lack of appetite. It is impossible to say whether the moderate amount of iodoform employed in the dressing, or the disheartening effect of the loss of voice by tracheotomy, was at the bottom of this trouble. Enough to state that it was deemed advisable to cheer up the patient by placing him under home surroundings. His wife took excellent care of him, and he returned to the hospital April 27, much strengthened in body and mind.

On April 27, under chloroform, the left half of the larynx was removed. A tampon-canula, made by Geo. Tiemann & Co., after my directions, was inserted and suitably distended, so as to prevent the entrance of blood into the trachea. After this an incision, commencing at the upper notch of the thyroid cartilage, and extending to the lower margin of the cricoid cartilage, laid bare the larynx in the median line. To this was added another incision commencing in the upper angle of the first cut, and extending horizontally to the anterior margin of the left sterno-mastoid muscle. The crico-thyroid ligament was split to admit a strong pair of bone pliers for the division of the thyroid cartilage; but it was found impossible to perform this act, as the strongly inclined position of the cartilage did not permit an effective handling of the instrument. Therefore, access was gained through an incision in the thyro-hyoid ligament from above, and in this manner an exact division of the calcified cartilage was successfully effected. After this the epiglottis was cut through lengthwise, the left half of the crico-thyroid ligament was divided, and the superior thyroid artery was included in a double ligature and cut through. The most difficult part of the operation consisted of the dissection of the lateral portions of the larynx and pharynx, closely adherent to the carotid artery by cicatricial tissue, caused by the extirpation of the submaxillary glands. Shallow incisions, running parallel with the course of the carotid artery, were cautiously made one after another, and the difficult task seemed almost completed, when suddenly a powerful jet of arterial blood welled up from the bottom of the wound. The bleeding point was easily secured in a pair of artery for-

ceps, and then it was ascertained, that the trunk of the superior thyroid artery (doubly ligated further below prior to this) had been cut away on a level with its inosculation into the carotid. A catgut ligature was applied around the main trunk above, another below the artery forceps, and when the instrument was removed a round hole in the side of the carotid became visible. The remaining adhesions, corresponding to the lateral portion of the pharynx on the left side, could now be easily dissected out. The tampon-canula was removed, and it was found that no blood whatever had entered the trachea. A soft tube was inserted into the œsophagus, the wound was loosely packed with iodoformed gauze, and an ordinary tracheal canula was left in the lower angle of the tracheal wound. Finally, the horizontal incision was closed by a number of catgut sutures. The duration of the operation was one hour and three-quarters—the anæsthesia throughout undisturbed.

Microscopical examination of the new growth by Dr. L. Waldstein gave the diagnosis of alveolar sarcoma.

The subsequent course of the wound was very satisfactory and free from fever or suppuration, the patient's only complaint being a rather profuse secretion of saliva. Nutrition was carried on by the œsophageal tube, the patient consuming considerable quantities of milk, eggs and an emulsion composed of beef tea and crushed boiled beef; finally, a generous supply of good whisky.

From May 10 on, the œsophageal sound was introduced twice daily for purposes of nutrition. On May 13, the tracheal canula was abandoned. On the same day the innermost layers of the iodoformed gauze packing became detached and were replaced. The entire wound was found to be in a vigorous process of granulation and was considerably contracted.

May 15.—The patient swallowed a small quantity of coffee.

May 16.—The plugging of the wound was discontinued. The edges of the vertical incision near its upper angle were brought together with a couple of silver wire sutures, but soon commenced to cut through and were removed as useless on May 18. At the same date plastic closure of the entire vertical opening was practiced. On account of cicatricial retraction the cutaneous surface of the left edge of the wound began to be much inverted, wherefore it was dissected up to the distance of about an inch from the margin, brought into exact apposition with the other side and there secured by four stitches.

May 22.—The patient swallowed some bread.

May 24.—He had a severe chill with a temperature of 104° F., accompanied by splenic intumescence. (One dose of quinine prevented

the return of a similar attack). His body weight had increased $4\frac{1}{2}$ pounds.

May 27.—The sutures were removed and the wound was found firmly united.

May 31.—Patient was dismissed cured, good deglutition being noted.

June 12.—In my office a small, suspicious glandular swelling was removed from the supra-clavicular region.

The patient presents now, Nov. 2, a remarkable improvement in his general condition. Compared with his former haggard, emaciated aspect, he looks as if rejuvenated, has a florid complexion, has regained more than his original weight and muscular strength, and is able to attend daily to his somewhat laborious occupation. Deglutition of solid and semi-solid substances is excellent; drinking, however, must be done slowly and carefully, to prevent the entrance of fluids into the trachea. He is able to speak with a hoarse whisper, that can be readily heard and understood across a space of 10 to 15 feet. The left side of the neck presents a deep lateral depression; the cicatrices are throughout soft and normal.

Laryngoscopic examination reveals a smooth, rather extensive cicatrix occupying the left side of the pharynx and larynx. The right vocal chord normally performs its functions.

The question of recurrence being set aside for the present, it may be safely asserted, that the operation, as far as the patient's well-being and comfort are concerned, has so far certainly produced a marked change for the better. And considering the far gone state of secondary glandular contamination, and the freedom from recurrence thus far preserved in this case, it may be predicted, that in future cases, where the disease will be detected early, and decisive measures will be taken at once, the results of the radical treatment of malignant neoplasms of the larynx suitable for unilateral extirpation will become more and more encouraging.

SYNOPTICAL TABLE OF TWENTY CASES OF UNILATERAL EXTIRPATION OF LARYNX.

No.	Operator.	Date, Age, Sex.	Operation Removed.	Result.	Diagnosis.	Remarks.
1.	Billroth, Vienna	1878. July 7. 50. M.	Left half of larynx, part of right vocal chord.	Cured. Died Nov. 1879, of recurrence.	Epithelioma of left half of larynx.	Good deglutition. Loud hoarse voice. No canula.
2.	Gerster, New York.	1880. March 5. 50. M.	Right half of hyoid bone, larynx, pharynx, right tonsil; epiglottis and adjacent parts of basis of tongue.	Cured. Died March 9, 1881, of pleurisy and cardiac failure. No relapse.	Adeno-sarcoma.	Rough whisper. Deglutition imperfect, esophageal tube was used to the end. No canula.
3.	Reyher, St. Petersburg.	1880. March 9. 57. M.	Left half of larynx.	Cured. No relapse fourteen months afterward.	Cancer.	
4.	Caselli.	1880. Nov. 9. M.	Right half of thyroid cartilage with large adherent tumor.	Died two days after the operation.	Enchondroma.	
5.	Hahn, Berlin.	1880. ? 67. ?	One half of larynx.	Cured. No recurrence 3 1-2 years after operation.	Cancer.	See No. 8.
6.	Billroth.	1881. Feb. 11. 65. M.	Right half of larynx and pharynx.	Favorable course in the beginning. March 15, secondary operation followed by sepsis. Died March 22.	Cancer.	

SYNOPTICAL TABLE OF TWENTY CASES OF UNILATERAL EXTIRPATION OF LARYNX. (Continued.)

No.	Operator.	Date, Age, Sex.	Operation Removed;	Result.	Diagnosis.	Remarks.
7.	Schede, Hamburg.	1881. Oct. 19, middle-aged M.	Right half of larynx.	Cured. No recurrence; patient alive 18 mo. after operation.	Infiltrating cancer.	Voice normal. Deglutition perfect. No canula.
8.	Hahn.	1883. ? M. ?	One half of larynx.	Cured. No recurrence. Alive nine months after operation.	Cancer.	Cases 5 and 8 speak so well with phonating canula that they decline to have external wound closed. Deglutition good.
9.	Billroth.	1883. May 11, 33. M.	Right half of larynx.	Cured.	Cicatricial stenosis.	Canula on account of returning stenosis.
10.	Clinton Wagner New York.	1885. Feb. 22, 53. M.	Right half of larynx and of first tracheal ring.	Died of collapse twelve days after operation.	Relapsing epithelioma, originally papilloma.	Operation preceded by two laryngotomies.
11.	Billroth.	1883. Nov. 8, 60. M.	One-third of right half of thyroid cartilage and portion of epiglottis.	Died Dec. 18, 1883. Secondary hæmorrhages; aspiration of vomited matter. Pneumonia.	Cancer.	
12.	Winiwarter, Liege.	1883. Dec. 18, M.	Right half of larynx, with preservation of mucous membrane.	Cured. Alive ten months after operation.	Perichondritis, with serious stenosis.	Loud but hoarse voice. No Canula. Good deglutition.

	Kuester, Berlin.	1883. ? 50. M.	One half of larynx.	Cured.	Sarcoma of vocal cord.	Good phonation. No canula.
13.	Kuester.	?	One half of larynx.	Cured.	?	
14.	Kuester.	?	Same.	Cured.	?	
15.	Kuester.	?	Same.	Died.	?	
16.	Kuester.	?	Same.			
17.	Billroth.	1884. June 25. 60. M.	Right half of larynx and part of mucous membrane of left half.	Cured. No relapse four months afterward.	Cancer.	Hoarse whisper. Good deglutition. Canula on account of cicatricial stenosis.
18.	Billroth.	1884. July 15. 58. M.	Right half of larynx and pharynx, and cervical glands.	Cured. Alive with relapse Sept., 1884.	Cancer.	Defective phonation. Defective deglutition.
19.	Billroth.	1884. Sept. 6. 46. M.	Right half of larynx and pharynx, cervical glands.	Cured.	Cancer.	De-glutition and phonation excellent seven weeks after operation.
20.	Gerster.	1885. April 29. 57. M.	Left half of larynx, part of left side of pharynx, left half epiglottis and cervical glands.	Cured. Alive without recurrence Nov. 2, 1885.	Alveolar sarcoma.	Hoarse voice. Good deglutition. No canula.

A CASE OF TOTAL EXTIRPATION OF THE LARYNX.

By ROSWELL PARK, A. M., M. D.

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AMERICAN cases of total extirpation of the larynx have been so few in number that I do not hesitate to report the following in this place, although a clinical lecture based upon it has already appeared.¹ The case was in the person of a medical gentleman, 64 years of age, whom I first saw in consultation with Dr. F. W. Hinkel, of this city. The doctor has kindly furnished me with some notes on the case from which I extract the following:

"Dr. P., first seen October 9, 1884. His voice was shrill, discordant, and very stridulous. He gave his age as 63 years. He had the appearance of rugged health, but stated that while a youth he had been "sent away to die of phthisis." After his graduation in medicine he developed perfect general health, which he had since retained, in spite of much abuse in civil and military life, and by excessive smoking. Said he had used as many as twenty cigars a day. He dated his throat trouble from an attack of acute laryngitis after great exposure in the early years of our civil war. Since then, has been annoyed by occasional attacks of hoarseness and sore throat, which gradually became more frequent, continuous and severe until, in the last few months, his voice had fallen into its present condition. Lately there were occasional darting pains through the region of the larynx. He had a hacking cough—especially at night—with little expectoration and no pain. Occasionally he had attacks of dyspnœa, which he termed "asthmatic attacks." Otherwise his personal and family history were good. He had never had a laryngoscopic examination.

¹ *Med. Press* of Western New York, December, 1885.

"The oro-pharynx was found unusually small in proportion to size of patient, much inflamed and extremely irritable. The arches of the palate were swollen and red. The uvula was of a purplish-red color, much thickened and covered with corrugated mucous membrane, but not œdematous nor elongated. The laryngoscopic examination was made with difficulty, owing to excessive faucial irritability. It revealed deep congestion and puffiness of the mucous membrane in the supra-glottic portion of the larynx. The ventricular bands were swollen, deep red in color, and not clearly defined. The location of the vocal bands was filled with two reddish-grey, irregular, sessile growths, apparently filling the ventricles on either side and covering both vocal bands. By careful examination they could be seen to extend on each side over the lateral walls of the sub-glottic portion of the larynx, so that the bulk of the growth was sub-glottic. The glottis was much and irregularly encroached upon. A tooth-like process from the posterior third of the right growth, and a similar process from the anterior portion of the left growth, transformed the chink into an irregular Z-shaped opening. The sub-glottic larynx was irregularly contracted in its lateral dimensions, rendering it impossible to see beyond the growths. The further encroachment upon this small breathing space by the swelling incident to acute congestion readily explains the 'asthma' from which he suffered at times. There was no ulceration present. The cushion of the epiglottis was swollen, but probing did not show marked tenderness over it or the growths. These latter I regarded as papillomata, but feared there was beginning epitheliomatous degeneration. Believing their complete removal *per os* to be impossible, I made use of soothing alterative applications, and warned the patient of the great possibility of malignant degeneration at his age, and of the possible future advisability of thyrotomy or even extirpation of the larynx.

"After a few days he disappeared suddenly from my observation. He came under my care again for a few days on January 8, 1885. He had been under Dr. Elsberg's care, in New York, in the interim. The condition and appearance of his throat were much the same as when first examined. On

April 20 I saw him again. He stated there had been some operative procedures by Dr. Elsberg. Owing to the unfortunate death of that eminent laryngologist it has been impossible to obtain, with any exactness, his prognosis or treatment of the case. An examination showed but little change in the growths, and that for the worse, the glottis being smaller and the growths more redundant. The patient was suffering at the time from a severe pharyngitis. The uvula was much inflamed, and dyspnœa was quite marked. Under treatment this disappeared, and the patient with it.

"I again saw him on June 10. In the interval he had visited Philadelphia, and was there seen by Drs. Seiler, J. Solis Cohen, and others. His condition was now changed much for the worse. There were darting pains through larynx and into left ear. Voice was gone completely. His breathing was noisy, difficult and hurried. Pulse rapid and weak. Sleep was disturbed, and had often to be taken sitting up, on account of sudden attacks of dyspnœa. He was losing his strength and spirits. The left ventricular band presented, on its anterior third, a smooth, rounded tumor, of deep red color and considerable density, shading into the surrounding congested mucous membrane. The growths over the vocal bands had increased somewhat in size, but were not ulcerated. There was exquisite sensitiveness over the cushion of the epiglottis and over the new formation in the ventricular band, when probed. The case being now plainly one of epithelioma, I seriously broached to him thyrotomy, or extirpation of the larynx, as the only means of relief from the disease, and explained that tracheotomy might be rendered necessary by the slightest diminution of his air-space by inflammatory swelling. Some indiscretion on his part precipitated an acute congestion of his larynx, and on the morning of June 14 I found him in my office, laboring for breath, weak, excited and somewhat cyanosed, after a sleepless night spent in a struggle for life. Finding tracheotomy necessary at once, I hurried him home."

It was in the condition thus described that I found the patient. As he was in danger of immediate suffocation there was no difference of opinion as to the immediate necessity for tracheotomy. This was consented to, and at once performed.

So little breathing space was there that we even feared to give an anæsthetic; we therefore urged that it be borne without. A syringe full of cocaine (four per cent) solution, was injected under the skin in the middle line of the neck, and the ether spray used as a local anæsthetic. With Dr. Hinkel's kind assistance operation was at once begun.

But pain was by no means abolished, and on this account the procedure was prolonged. Finally, after dissection was partly accomplished, and the deep parts so far exposed that, in case of necessity, the trachea could be roughly and quickly opened, the patient's demand for chloroform was acceded to, and it was carefully administered.

No small difficulty was experienced in properly exposing the trachea, and the operation was, hence, annoyingly prolonged. Even after its exposure the proper introduction of the tracheal tube was rendered very difficult; and the introduction of wire sutures through skin edges and the margins of the tracheal opening, as I had contemplated, was impossible. Full anatomical explanation of these difficulties was furnished by the subsequent operation, which showed that the trachea not only lay at an unusual depth, but had undergone a considerable calcification (senile) by which it had lost most of its elasticity. Desisting then from this effort a tracheal tube was finally introduced. Relief was immediate, and in two days he was up and about his room and had recovered from the physical exhaustion of his nearly complete apnœa.

During the latter part of the first week there was a mild amount of nocturnal delirium, which we were then inclined to ascribe to the influence of opiates, but which, in the light of subsequent developments, we had to consider traumatic in origin.

The tracheotomy wound granulated so rapidly that in the absence of sutures the tube could not be kept in place, but was crowded up and out by the healing process. But the more or less inflamed and tortured larynx, even though filled up with growth as it was, had had a week's rest, and after the removal of the tube he breathed with considerable ease.

The time had now come when the patient, who had a full realization of his predicament, must either decide on some still

more radical measure or await death from extension of the disease. In favor of extirpation spoke the excellent physical condition and powers of endurance of the patient, and the facts that no cancerous cachexia was to be noted, and that there was no sign of any involvement of parts outside the laryngeal box. Against it, spoke only the known dangers of the operation. Our advice was in favor of operation, and this was also the advice of Dr. Carl Seiler, of Philadelphia, who saw him while on a trip to the West. The patient made his choice of radical operation, after a full presentation of its advantages and dangers.

Accordingly, he took a private room in the Buffalo General Hospital, where he was prepared for operation. On June 28, 1885, complete extirpation of the larynx was performed. During it I had the valuable assistance of Dr. Phelps, who kindly took charge of the anæsthetic (chloroform with 1% of amyl nitrite), of several other of my colleagues of the hospital staff, and of Drs. Seiler and Hinkel.

It was necessary to make a long incision, in the middle line, which ran from a little in front of the body of the hyoid to one inch below the upper end of the sternum; this, as the head was drawn backward over pillows, made it about six inches long. In it were included the remains of the previous tracheotomy incision. Careful dissection was then made down on either side of the larynx and trachea; the muscles attached to the sides of the larynx were peeled back with a sharp periosteum elevator. This separation of soft parts on either side was carried as high as the hyoid bone and as low as the second or third ring of the trachea. Vessels were caught in hæmostatic forceps as fast as they bled, and tied later with catgut; a few larger veins were tied twice and cut between ligatures; about twenty-five hæmostatic forceps were employed, once or twice all being in use at the same time. Up to this time patient had breathed his chloroformed air by the mouth. At this time, after the deep parts had been well exposed, and the lateral portions held aside with retractors, and after my fingers had pretty completely separated the trachea from the œsophagus, it was thought best to open the thyroid cartilage for exploratory purposes. This was no easy task, and sharp

cutting bone forceps were necessary before it could be accomplished, so firmly was it calcified. By this exploration it was quickly noted that the growth was well confined within the laryngeal walls. So without further loss of time the trachea was divided, first longitudinally through its upper three rings, and then transversely between the first and second ring. A Trendelenberg tampon tracheal canula was then inserted, but its rubber balloon proved faulty; consequently, I packed sponge around its main tube and used it as an ordinary tracheal tube, save that the tube and funnel for the anæsthetic connected with it were utilized during a part of the remaining time.

The larynx and upper tracheal ring were now rapidly separated from the œsophagus, and, after this separation was complete from below, the thyro-hyoid membrane was divided and then the remainder of the lateral walls of the lower pharynx. The constrictors were dissected off from their insertions into the larynx, and the whole removed in one piece. Hæmorrhage was checked, and then the parts explored for evidences of any extra-laryngeal suspicious tissue. None was found here, but I decided to remove the uvula, which had been for some time very sensitive, and in which a little firm nodule was felt. The upper part of the epiglottis, with its glossal and lateral connections, was also left *in situ*.

Particular attention was then given to every bleeding point, and hæmorrhage, which had at no time been alarming or uncontrollable, was perfectly checked. A little blood had run down the trachea and was coughed up at intervals. The tracheal tube was then removed and a strong silk suture introduced on either side, through the skin and the upper tracheal ring which, it will be remembered, had been split vertically. These were the only sutures used, and were for the purpose, not of trying to pull the trachea up in the neck, but simply of holding it well to the front. A large single trachea tube of aluminum, made for the purpose, was then introduced and held by tapes around the neck. Over its upper surface fell the anterior cut margin of the œsophagus. Iodoform was dusted sparingly throughout the wound, and the whole cavity carefully packed with iodoform gauze, so arranged that a pathway to the œsophagus was left, this latter being lightly plugged with the same material.

Further details of the case and of its after treatment are deemed unnecessary here. I will simply add that shock was comparatively slight and reaction satisfactory. Beginning five hours after completion of the operation food was regularly administered every four to six hours, the œsophageal tube being introduced through the wound.

Convalescence was only broken by one incident, but this came near being disastrous. On the fifth and sixth days it was noticed that he seemed a little dazed, and his written messages were somewhat incoherent; and I was reminded of his similar condition after his previous operation. Late in the evening of the sixth day, while apparently asleep, and being watched by one pupil of the training school for nurses, he suddenly jumped out of bed, threw up a window (second story) and made ready for a spring. The nurse seized him by his night-clothes and pulled him back. Then ensued a severe struggle, during which she was severely bruised, he endeavoring to escape and she to hold him back; in a moment her calls for assistance were answered and he was put back in bed. His acute mania was soon subdued. Next morning his temperature was only 99° , and he showed no evidences of his wild night, save that his thoughts were incoherent. In two days he had practically recovered, though his mind was not quite clear for two weeks afterward. This could not have been iodoform intoxication nor the effects of opium, because both had been used in minimum amounts; I therefore class it among those obscure cases of so-called "traumatic mania," about whose etiology we know practically nothing.

Nevertheless, after this his wound was dressed with cotton steeped in a saturated solution of salicylic acid and potassium chlorate, and to the stimulating effect of the latter I ascribe the remarkably rapid granulating process by which the wound closed. In three weeks the feeding tube was introduced through the mouth instead of by the wound, which was no longer sufficiently open. In five weeks he was wearing the tracheal portion of his artificial larynx; in six weeks the pharyngeal portion of it, was breathing through his nose once more, and was able to whisper so that he could be heard across the room. In seven weeks he was able to swallow soft

solids, when the obturator of the upper tube was introduced. In eight weeks he was able, by means of the vibrating reed inserted in the tubes, to articulate with perfect distinctness.

As nearly as I can gather, never have the processes of repair occurred with greater rapidity than here; in fact, as I recall the formidable wound, it seems almost incredible that healing could have taken place as rapidly as it did.

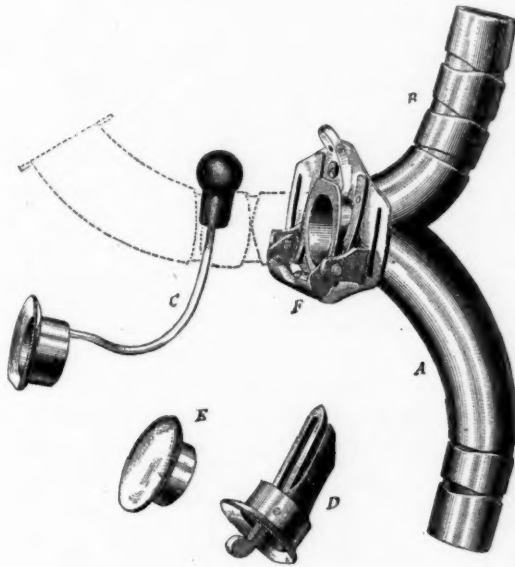


FIG. I.—GUSSENBAUER'S ARTIFICIAL LARYNX.

The patient is now wearing an almost exact copy of Gussenbauer's *artificial larynx*, made from pure silver, from a model in the writer's possession. As this has never received adequate illustration in this country a description of it is subjoined.

It consists of a tracheal tube of large size (*A*) with rings at its lower end permitting a slight motion, corresponding to the natural flexibility of the trachea. Through its front plate and through an opening on its upper curvature passes a second or pharyngeal tube (*B*), made also flexible (or not, according to the case); with an opening on its lower curved surface, so placed that a stream of air may play freely through both tubes, even though the external outlet be closed. The upper end of

the pharyngeal tube lodges behind and below the epiglottis, it this have been left *in situ*, or behind and below the base of the tongue, as the case may be. Around it the œsophagus granulates and closes, so that after the healing process is complete the only passage from the pharynx into the larynx is by way of the metal tube. In order that fluids and solids may not pass through this, an obturator (*C*) is provided, which is passed through the external opening and up through the tube, so that its rounded upper end plugs the upper end of the pharyngeal opening, thus preventing passage of anything into the trachea. But since this would also shut off the air, the obturator is attached below, not to a solid plug, but to a ring, as seen, which fits accurately into the external opening of the instrument, through which, then, the patient breaths so long as this plug is worn. Except at meal times a simple stopper (*E*) is worn, so that at all other times he breaths naturally through the nose and mouth. After a time, by an instinctive education of the pharyngeal and buccal muscles, the upper end of the tube is protected during the process of deglutition, and patients wearing these instruments learn to swallow readily without the assistance of the obturator.

Nothing now is lacking save a substitute for the vocal cords, something which, by vibrating in the air current, may produce a distinct *tone*.

Such a substitute is provided by a free metallic reed, like a melodeon reed, playing freely in a movable slotted bar (*D*), and fitted inside of a stopper like the other one. This movable bar carrying the reed has an external lever, by means of which the wearer is enabled, with a touch of the finger, to throw it into or out of the air current, and thus—as it were—to voluntarily open or close the glottis. With this part of the instrument *in situ*, and with the reed in the air current, the metal strip vibrates as it does in the jew's-harp, and the sound thus produced is converted, by the articulating parts above, into something more than a whisper—into *distinct speech*.

The voice, thus produced, though a monotone, is nevertheless a perfect voice in every respect save *pitch*.

This apparatus does not represent the first efforts that were made, even by Gussenbauer who was the first to succeed. to

to devise a substitute for the larynx, but it shows the instrument in form more perfect for the majority of cases than the mechanisms of Foulis or Bruns.

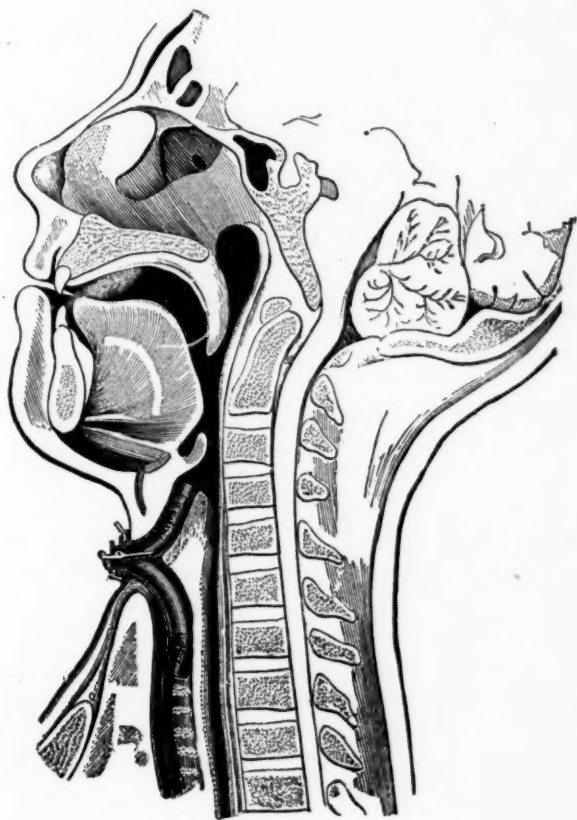


FIG 2. ARTIFICIAL LARYNX IN POSITION.

[This figure, modified from one of Schüller's, represents the instrument *in situ*. The artist's notions of topographical anatomy have led to some distortion of the anatomical relations, but without interference with the main purpose of the illustration.]

At date of writing, nearly six months after the operation, the details of which have been thus given, its subject is apparently in perfect health, has gained largely in flesh and strength,

goes on extensive journeys and has even been out on a hunting trip.

Microscopic examination of the intra-laryngeal mass revealed typical epitheliomatous structure.

In the table of cases of complete laryngectomies given by Cohen in the *International Encyclopædia of Surgery* (vol. v., p. 764 *et seq.*), two only by American operators are given.

No. 28, by Dr. Lange, of New York. Recurrence of sarcomatous growth with death from asthenia seven months after operation.

No. 67, by Dr. Hodgen, of St. Louis. Death after four days.

CASE OF TOTAL EXTIRPATION OF THE LARYNX.

By FREDERIC LANGE, M.D.,

OF NEW YORK.

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THE PRESBYTERIAN HOSPITAL.

THE following account of a case of total extirpation of the larynx, hitherto unpublished, is incomplete in some points, on account of the defects of the hospital record. All the essential points, however, are given which may be needed to give it statistical value:

Mrs. H. L., 30 years of age, an otherwise strong and healthy woman, with a good family history, was admitted to the German Hospital in April, 1884. On the 11th of April Dr. A. G. Gerster, then on duty at the hospital, performed laryngo-fissure on account of an intense dyspnoea from which she was suffering, due, apparently, to a papillomatous growth at the height of the vocal cords, and removed, mostly by scraping, papillomatous masses of a suspicious character. After about fourteen days the patient was discharged in good condition, but in consequence of reappearing and increasing dyspnoea was readmitted during my service in July of the same year. There

existed then almost total occlusion of the larynx by an ulcerating growth, which protruded, if I am not mistaken, from the anterior and left lateral side of the larynx. Low tracheotomy was at once performed, with complete relief to the urgent dyspnœic symptoms, on June 6. On the 11th of July extirpation of the larynx was performed, the tumor being assumed to be of carcinomatous nature, though no lymphatic glands, so far, seemed to be involved. Incision in the middle line longitudinally; horizontal cross incision corresponding to the hyoid bone. Removal of the whole larynx, including *épiglottis* and cricoid cartilage. During the operation the tampon-canula, recommended by me some years ago, was used. The same, through inversion of an ovoid soft rubber ball, secured a very soft, equal and safe closure of the trachea. Not a drop of fluid passed by it, though the wound, during the operation, was freely irrigated by antiseptic fluids. The operation altogether lasted about one hour, and was finished without any disturbance.

According to Hahn's proposition the anterior wall of the *œsophagus* was stitched to the mucous membrane in the region of the hyoid bone, the external wound partly united and an iodoform gauze tampon loosely inserted. The patient being of a very nervous disposition, and still more so by the temporary loss of her speech and the idea of being fed by a stomach tube, giving away to every impulse of swallowing and coughing, the united surfaces separated very soon, so that from the second day the wound had to be treated entirely open. My rubber tampon remained in the trachea, and though it did well enough as an occluding apparatus, it proved to have the disadvantage that its removal by reëverting the rubber bulb was not easy, partly on account of the short sliding handle attached to the balloon, partly on account of a slight impediment, caused by the swelling of the mucous membrane above the rubber ring. The first point can be very easily improved. In reference to the second one I might say that nowadays the application of an iodoform tampon according to Hahn's proposition, allows of the use of a simple tracheal tube during the after treatment.

The patient did well for four days. On the fifth day she got suddenly high temperature and died on the morning of the fifth under septic symptoms. There probably must have taken place some direct septic inoculation. There was at the same time in the Hospital and on the same floor another patient with ulcerating carcinomatous goitre which had perforated into the trachea and had made tracheotomy necessary. It was impossible, in her case, to prevent a most intense decomposition and fetor. Probably, by some attendant, direct trans-

portation from her to the patient on whom extirpation of the larynx had been performed, had taken place.

The tumor was a carcinoma. It had perforated already exteriorly the thyroid cartilage, and the overlying external muscles had to be removed to a little extent at the operation.

NOTE ON THE OCCURRENCE OF GANGRENE OF
THE SCROTUM, AFTER THE REMOVAL OF
ENLARGED INGUINAL GLANDS.

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ON November 6, 1885, we presented a brief paper upon the above subject at the meeting of the Clinical Society of Maryland. The object of our communication was to elicit information concerning the experience of other surgeons in regard to the development of gangrene of the scrotum after the ablation of diseased inguinal lymphatic glands. In brief it may be stated that three cases of scrotal gangrene have followed the removal of these glands, under our observation, and we desire to ascertain whether this is merely an accidental complication or whether it is more or less inherent to such an operation. When it is remembered that the removal of these glands is a rather infrequent procedure in this city, the occurrence of three cases of gangrene of the scrotum after such removal is at least suggestive. During the discussion of the above mentioned paper Dr. Platt spoke of another case which came under his observation in Boston in 1879. The first

thought which enters one's mind in regard to these cases is that the gangrene must have been due to erysipelatous or other septic inflammation, but such does not seem to have been the case in three of the cases reported. In the extirpation of these glands the vascular and lymph channels supplying the scrotum are more or less interfered with, but, as the tissues are freely supplied, it seems hardly probable that the gangrene is due to this cause. In no case were the testicles or cords involved in the gangrene. It is not necessary to go into much detail in the description of the cases in which the gangrene occurred.

CASE I. *University Hospital, 1881. Service of Dr. R. Winslow. Chronic tuberculous adenitis of inguinal and saphenous glands. Excision, gangrene of scrotum. Death from pyæmia.* A Frenchman about 40 years of age entered University Hospital in July, 1881, suffering from a chronic enlargement of the inguinal and saphenous lymphatics, with suppuration, in consequence of which the man had run down in health and was debarred from pursuing his trade. On July 16, 1881, the whole diseased mass on both sides was removed, the dissection extending far down Scarpa's triangle on the left thigh. The wounds were loosely approximated and were dressed with carbolized oil and oakum. The constitutional and local phenomena were favorable for several days, but at the expiration of a week the wound began to lose its healthy appearance, and a few days later the scrotum became cedematous, which terminated in gangrene, involving one-third of the sac. He died three weeks after the operation from pyæmia. In this case the scrotal complication did not extend from the wound, nor did it appear to be erysipelatous in character.

CASE II. *Bay View Hospital. 1884. Service of Prof. Tiffany. Chronic enlargement of the inguinal glands. Excision, gangrene of scrotum. Recovery.* This was also a Frenchman, aged 40 years, who was admitted into Bay View on May 24, 1884, on account of a chronic enlargement of the inguinal glands with suppuration. Ablation of the mass was performed by Prof. Tiffany, and the patient did well for about four days, when the scrotum became cedematous, and a few days subsequently gangrene set in on both sides. His wounds had been dressed with iodoform and oakum. Dr. Tiffany states that the scrotal swelling was not due to erysipelas extending from the wound to the scrotum. This man made a good recovery.

CASE III. *Bay View Hospital, 1885. Service of Dr. Branham.*¹ *Inguinal adenitis. Excision, gangrene of scrotum. Recovery.* An Irish laborer, aged 30, was admitted into Bay View on account of an enlargement of the inguinal glands. These were excised in March, 1885, by Dr. Branham. The patient did well for about ten days, when an inflammatory condition of the wound and scrotum was noticed, which eventuated in gangrene of the scrotum at its lower portion, and a large abscess in Scarpa's triangle. It is estimated that two-thirds of the scrotum sloughed. The patient made a good recovery. It is possible that this case was one of erysipelas, especially as erysipelas had been recently in the same ward.

CASE IV. *Boston City Hospital, 1879. Service of Dr. Geo. W. Gay. Reported by Dr. W. B. Platt, in Medical News, November 14, 1885.* A man with an inguinal enlargement was operated on by Dr. Gay, with the result of a redness and swelling of the scrotum in a few days, followed by limited gangrene.

We do not pretend to explain the etiology of the gangrene in these cases, and it is quite probable that different factors may have been operative in the individual cases. Erysipelas was probably the cause in one case; as to the others, whether it was due to obstruction of the venous circulation, or to trophic nerve lesions, as is held by Dr. Platt, is not clear to the writers of this note.

¹The after treatment of this case was conducted by Dr. W. B. Platt.

EDITORIAL ARTICLES.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL SCIENCE IN ITS SURGICAL RELATIONS.

As in every science, all new discoveries and great advances in recent medical science have been associated with the invention and exercise of new methods of investigation. But a short time ago we had occasion to remark in these pages that the original and era-making discoveries of Cohnheim in pathology were the outcome of new methods of research employed by him; and it is only necessary to glance at any physiological or pathological text-book in order to realize the multiplicity of such instances. The credit of having devised new and successful methods of research even supersedes that of having happily applied them; for they are means by which numerous scientific investigators are enabled to do new work, which would be entirely beyond the power and capacity of a single man.

In the history of the evolution of bacterial science no such important era is to be recorded as that which commenced only about four years ago. This epoch in bacteriology is marked by the introduction of a new method of cultivating bacteria, namely, that of employing hard and transparent soils for this purpose. This was done by Rob. Koch, of Berlin, and it is to this event that the present ascendancy of the science of bacteriology is chiefly due. Koch's method is in fact to bacteriology what the cellular system has been to pathology, and the wave-theory to physical science.

It is true, new methods for the cultivation of bacteria have frequently been introduced since Pasteur, in 1857,¹ first inoculated his fluid media with germs: Klebs, in 1873, published his method of fractional culture,² Schroeter used solid media, as potatoes, for the

¹Mémoire sur la fermentation appelée lactique. Compt. rend. Vol. 45.

²Beiträge zur Kenntniss der Micrococcen. Archiv für experimentelle Pathologie. Vol. I.

cultivation of bacteria, in 1872,¹ and Klebs, 1873, used isinglass, and Brefeld², 1874, gelatine to prevent the evaporation and motion in the media.

Hueppe, in his recent work on bacteriological technique³ points out how, before Koch published his method of transparent solid culture-soils⁴ all the elements of his system, had in reality already been discovered and made use of, and how it only needed a combining talent to produce a brilliant result.

But in spite of the fact that the elements of his method were known, the means of culture before Koch were highly inadequate and uncertain. Not only could, in former times, pure cultures not readily be obtained outside of the animal body with which to inoculate the soils, but when, by tedious processes, one organism had finally been isolated from a number, it was not always the one desired, but generally quite a different one. Even the employment of the one method which afforded comparatively the most satisfactory results, that of diluting the fluids containing the germs to such an extent that two drops of it only contained one germ⁵ was encumbered by the conceded necessity of making 50 to 100 separate cultivations in each case⁶ in order to secure reliable results—; and this proved a serious obstacle to its general adoption. The other methods, although very subtle in their conceptions, were only applicable after a pure cultivation had been procured.

One of the chief points, therefore, in Koch's system, was his use of his solid soils to obtain inoculable matter in a pure form,

The combination of the transparent with the solid properties of the cultivation-soils, which represents, as mentioned above, the chief features of Koch's method, was, however, no mere chance invention of his. It was, on the contrary, a full conviction and a perfect consciousness, that his method was at once the most simple and the most effi-

¹ Ueber einige durch Bakterien gebildete Pigmente. *Cohn's Beiträge zur Biologie der Pflanzen.* Vol. I. Hft. 2.

² Methoden zur Untersuchung der Pilze. *Verhandl. der phys. med. Ges. in Würzburg N. F.* Vol. 8.

³ Methoden der Bakterien-Forschung, Wiesbaden, 1885.

⁴ Zur Untersuchung von pathogenen Organismen. *Mittheilungen aus dem Kaiserlichen Gesundheitsamt.* Vol. I.

⁵ *Naegeli*, 1871. *Naegeli and Schwendener: "Das Microscop."* 1877.

⁶ *Fits*; *Berichte der deutschen chemischen Gesellschaft.* Vol. XV. VII.

cient mode of procuring pure cultures outside of the animal body, that imbued Koch when he first published his results; and it is impossible to read his communications, published in the reports of the Imperial Board of Health, without having this conviction impressed upon one. It is here that he insists on the immense importance of the *purity* of the cultures; that is to say, it is absolutely necessary that only one single kind of micro-organism should be present at one time in a growth used for scientific experimentation; or, in other words, a growth, to be a pure culture and fit for use in experiments, should only have proceeded from one single germ-element.

And here he also sums up the essential points requisite to all bacteriological investigations: that all the vessels used for cultivations be thoroughly disinfected and pure; that the covering of the vessels effectually exclude the entrance of germs suspended in the air; that suitable and properly sterilized media be employed; that none but the specific germs to be examined be contained in the material used for inoculation; and that no germ be introduced from the surroundings by means of instruments or from the atmosphere during the process of inoculation.

Although the strict enforcement of these rules is very difficult when dealing with fluid culture-soils, he points out that when solid soils are used, the inoculation is much simplified; as even if a germ from the atmosphere should fall upon the exposed surface of the soil during the process of inoculation, it would, in all probability, fall upon some other point than that chosen for inoculation and could here develop by itself without contaminating the intended culture, being confined to its place by the solidity of the soil. The chances of germs from the atmosphere happening to fall exactly on the point of purposed inoculation are still more diminished, when two or more vessels are used for each experiment. Thus Koch's method appears not only the most simple and easily effected method, but the most reliable and the most trustworthy at the same time.

Before these improvements and developments in the cultivation of bacteria were achieved, Koch had already added important features to the methods of examination of micro-organisms by his publications of

1878¹ and others,² in this case, as well, combining certain methods which till then had only been separately practiced, rather than originating completely novel ones.

Weigert³ had used aniline dyes to color micro-organisms in microscopic specimens in 1875; Abbé had mathematically constructed his celebrated lens of illumination,⁴ and Zeiss, of Jena, manufactured it in 1873. Immersion-objectives had been in use since Amici's time, and had been improved by Stephenson (1878); while the practice of drying liquid objects onto cover-glasses for the purposes of microscopical examination and the use of photography for procuring exact representation of microscopic objects appear to be of less recent date; but the methodical combination of all these devices into one complete system was first effected by Koch. The micro-organisms themselves have been the object of observation and study for ages.

Allusions to them are made by the Roman authors,⁵ and it is probable that Leeuwenhoek (1680) saw them with his instruments.⁶

Ehrenberg was the first (1828) to observe them with scientific accuracy; and Schwann in 1837 asserted that the atmosphere was always laden with fermentive and putrefactive germs.⁷

Flügge⁷ points out how the further development of bacteriological problems proceeded simultaneously in two different lines; the one relating only to such fermentive and putrefactive processes, which ultimately led to the acceptance of a vitalistic theory of fermentation, a question which, however, is not at present even fully solved; this problem we at present leave aside as more foreign to our subject. The other line of development was confined solely to the action of germs in disease; and this science ran its course quite independently of the others.

¹ Untersuchungen über die Ätiologie der Wundinfections Krankheiten. Leipzig. 1878.

² Methoden der Bakterienforschung. F. Cohn's Beiträge zur Biologie der Pflanzen. Vol. I. Hft. 3.

³ Bericht über d. Sitzung der Schles. Ges. für Vaterländ. Cultur. Dec. 10, 1875.

⁴ M. Schulze's Archiv für microscop. Anatomie. Vol. 9.

⁵ Lucretius. 95. B. C. Terentius Varo, 116-27 B. C. Quoted Amer. Journ. Med. Science, Jan. '85. Review. Sternberg.

⁶ Hoole's translation, London, 1807, Vol. I., p. 207.

⁷ vid. C. Flügge. Handbuch der Hygiene, etc., Von Pettenkofer u. Ziemssen. Vol. I. Abth. 2. Hft. 1.

Hufeland first pronounced diseases due to a "contagium animatum," and such men as Kirchner, Linné, Wichmann attributed the contagiousness of infectious diseases to the establishment of living germs in the body.

Henle,¹ indeed, at a time when nothing was definitely known by experiment, and when our present methods were not invented nor developed, theoretically defined and described the nature and properties of these agents of disease, anticipating later knowledge so exactly that his work played an important part in developing it.

After Bassi (1835) had traced the muscardine, a disease of the silkworm, and Tulasne, De Bary and Kühn certain diseases of grain and of the potato to micro-organisms, Pollender, 1855, and Davaine, 1863, were enabled to prove organisms the cause of splenic fever.

Enthusiastic experimenters (Hallier) even went so far in this line of thought that they soon claimed to have found the specific organisms of nearly all infectious disease.

Then, however, came a reaction, for De Bary proved Hallier's theories untenable and his experiments faulty. This was not without grave influence upon the further evolution of bacterial science, and, indeed, for a time the development of the knowledge of the cause of disease was seriously impeded.

Nevertheless, a period of renaissance soon appeared. Rindfleisch, Waldeyer and von Recklinghausen (1866, 1870) were able to demonstrate the presence of germs in pyæmic processes, and Hüter, Oertel, Orth, etc. (1868-1874), first threw light on the parasitic nature of such diseases as erysipelas, phlegmoné, diphtheria and puerperal fever. Pathological experiments were also conducted at this time by Coze and Feltz, Davaine, Hüter, Eberth, Klebs and many others (1866-1872), and Lister's antiseptic dressings were of utmost influence in developing the theories of infections of wounds.

Thus, little by little, and in spite of much opposition (Billroth, 1876), the germ theories gained ground and bacterial science so far developed that during the preceding year laboratories and professorial chairs exclusively devoted to the study of micro-organisms have

¹ Pathologische Untersuchungen, 1840, Handbuch der rationellen Pathologie, 1853.

been established in connection with many clinics or hygienic institutions, on the continent, in England, and of late also in America.¹ And although at the present time many adverse expressions of personal opinion may be heard from purely contemplative critics, the actual evidence in favor of the germ theory of disease is steadily increasing, and all those who have themselves done practical work in the special lines are firm followers of the new science.

We propose in this paper to review the more recent advances made of late in bacteriology, as far as they are of interest to surgery, in a concise form, though claim cannot be laid to exhaustiveness, and the matter will be restricted as much as possible to the more important publications of the last two years. To this further reviews will be added from time to time, as articles may appear.

Before turning to this subject, however, it is necessary to premise a few remarks on the nature of bacteria and the methods of cultivation now in use.

It suffices for the purposes of this paper to mention only a very few of the main biological and physiological conditions of the micro-organisms. Leaving aside all morphological systems of classification of these organisms, we simply bear in mind that they belong to the lower orders of plants (Cohn). We must, however, distinguish between the *fungi*, the *cryptococci* and the *schizomycetes*, with all of which the culture-experiments have to deal. All these forms consist, in their simplest state, of single cells, but they differ in their growth. The *FUNGI* grow by developing into long filaments, *hyphæ*, which frequently ramify, and the entire growth before fructification is called *thallus*. In contradistinction to this state the mass of ramified hyphæ is called *mycelium*; other hyphæ growing out of this mycelium develop sporangia, which contain *spores*, or they simply form spores. These latter are round cells, some of which are capable of motion; these, after a shorter or longer period, again grow and develop into hyphæ and form a mycelium. Common mould will serve as an example of this species. The fungi grow best on a slightly acid soil.

¹ To the knowledge of the writer bacteriological laboratories have been instituted in the city of New York in connection with the Bellevue Hospital Med. College, in the Carnegie laboratory and the New York Polyclinic.

The CRYPTOCOCCI, instanced by yeast, grow by sprouting; that is to say, part of the membrane of the cell bulges out and is subsequently choked off. These micro-organisms cause fermentation in the media in which they are cultivated.

The SCHIZOMYCETES are either round in form (*micrococci*) or oval (*bacteria*, strictly speaking) or rod-shaped (*bacilli*) or shaped like threads, either straight or spiral (*spirillum*, *vibrio*, *spirochaete*) and often possess a rapid motion, produced by cilia. The micrococci are sometimes grouped in pairs, and are then called *diplococci*; when found in chains (*torula*) they are termed *streptococci*; when in bunches, *staphylococci*; when in large masses they are designated *zooglæa*.

The schizomycetes, also, chemically affect the media of cultivation; some of them produce colored pigments and many of them, when inoculated into the animal body, produce diseases. They demand an alkaline or neutral soil.

Their growth ensues either by division or by means of *spores*. The latter are small, round or oval, resistant bodies of great refractive power to light, which are found within the substance of the bacilli or filaments and which continue to live after the bacilli have become disintegrated, and which, in turn, under favorable circumstances, develop into bacilli, or into whichever form originally produced them—the germs and species remaining distinct in these as in other forms of vegetable and animal life.

Each of these three varieties mentioned may complete their evolution as soon as they meet with the conditions favorable to life, for instance, on culture soils, imitated from the media where the organisms were first observed.

The human body serves as a culture soil to certain forms of all the three varieties. The *actinomyces*, a species of fungus, gives rise to the disease called actinomycosis in man; species of cryptococci produce certain affections of the pharynx in man—the *mycoderma vini*, according to Grawitz, or according to a more recent author,¹ a microbe allied to *Bonnardeus monilia candida*: and *spirochaete Obermeieri*, one of the schizomycetes, is believed to be the cause of relapsing fever.

¹ *Plant*, Beitrag zur systematischen Stellung des Soorpilzes in der Botanik. Leipzig. 1885. H. Voigt.

All such bacteria as are able to develop life in the human subject are termed *parasitic*. Bacteria cultivated outside of the human body are called *saprophytes*.

To determine whether bacteria can live without oxygen (*anaërobia*) or not (*aërobia*), what gases, etc, they produce, at what temperature they best thrive, and numerous other questions of this kind, complicated apparatus and very delicate chemical methods are employed in the laboratories.

Diverse theories have been put forward to explain the action of bacteria on the culture soils and on the human body. This action is generally a chemical one, and consists in dividing the complex organic compounds (as albumen) into their chemically simpler constituent parts (as peptone—leucin, tyrosin, etc.) Such chemical divisions are recognized as belonging to certain principles contained in organic secretions (as for instance, to pepsin in the gastric juice). Such principles are called *enzymë*, while similar chemical principles imagined to be the product of bacteria and to possess the power of rendering the human body diseased are called *ptomaines*. These theories are all more or less hypothetical; but in whatever manner the rationale of the action of germs on the body may be explained, that does not materially alter the relation of cause and effect between the presence of germs and disease.

W. VAN ARSDALE.

(TO BE CONTINUED.)

COCAINE AS AN ANÆSTHETIC; ITS STATUS AT THE CLOSE OF
THE FIRST YEAR OF ITS USE.

At the meeting of the Ophthalmological Congress held at Heidelberg in September, 1884, at the request of Dr. Karl Koller, of Vienna, Dr. Brettauer, of Trieste, demonstrated that the hydrochlorate of cocaine had marked anæsthetic power upon topical application to the eye. The immediate wide publication of the results of these demonstrations awakened general attention to the properties of the drug as a local anæsthetic.

The leaves of the coca plant, called erythroxylon coca by Lamarck, have, beyond the memory of man, been used by the natives of South America and by the Rajpoots of India as a tonic stimulant and intoxicant, and preparations of them have been gradually finding their way into pharmacy. Gadecke in 1855 extracted an alkaloid from the leaves which he called erythroxyline and two years later Dr. Samuel R. Percy of New York discovered the alkaloid independently, exhibiting a specimen which he had isolated, to the New York Academy of Medicine, also giving it the name of erythroxyline, but it was not until 1860 that Niemann announced its physical properties and called it "cocain." Schroff observed that it had an anæsthetic influence on the mucous membrane of the tongue and Moreno y Maiz, in 1868, after experiments with the hypodermic injection of the acetate, observed, after ten minutes, distinct loss of superficial sensibility over a circumscribed area; the frog's sciatic nerve was exposed after fifteen minutes and sensation was found to be completely destroyed, from which he concluded: *Pourrait-on l'employer comme anæsthésique local.* In spite of this, the practical application of the drug escaped him. Rossbach, in 1880 remarked that as cocaine produced localized anæsthesia, further researches might prove of advantage, and Von Anrep in the same year noticed that the sensibility of the skin was abolished by hypodermic injections of solutions of the drug, that the tongue became numb when touched with strong solutions, and that it had a temporary mydriatic effect on the pupil.

Practical application to anæsthesia in surgery was, however, discovered by Dr. Karl Koller, of Vienna, Assistant Physician to the Vienna General Hospital, whose attention was called to the probable power of cocaine as a local anæsthetic by a study of the therapeutic action of the drug published in August, 1884, by Dr. Sigmund Freud. Surmising that if it paralyzed the terminations of the nerves of the mucous membrane of the tongue, it would probably have the same effect on the nerves of the cornea and the conjunctiva, he first experimented upon animals in the laboratory of Professor Stricker, and, emboldened by his success, extended his experiments to the human eye, using a 2 per cent aqueous solution of the hydrochlorate, and by his success, made one of the most positive additions to surgical knowledge of a century already notable for surgical progress.

The alkaloid, the composition of which has been determined by Losson to be $C_{17}H_{21}NO_4$, crystallizes in large four to six-sided colorless prisms; is bitter to the taste; benumbs the tongue like aconitine; is soluble in 704 parts of water at 12° C., readily in alcohol and still more readily in ether; and forms crystallizable salts readily by union with dilute acids. Among those prepared are the sulphate, nitrate, tannate, oxalate, salicylate, borate, citrate, tartrate, hydrobromate and the one best known to science—the hydrochlorate ($C_{17}H_{21}NO_4HCl$).

The hydrochlorate is the salt generally used and understood in the present article unless another is specified. Much of the salt in the market is more or less impure, of an amorphous character, varying in color from brown to yellow and adulterated with the alkaloids hygrine and ecgonine, also produced from the coca leaf. The pure salt consists of white or very slightly colored crystals—the facets evident in a strong light to the naked eye and readily perceived with a low magnifying power—perfectly soluble in water, producing a colorless solution and without odor.

Cucaïne, according to Sir Robert Christison is a preferable name for the alkaloid, since “cuca” shows the native pronunciation of the plant and, as well, serves as a distinction from other similarly named products. The objection to the name is certainly valid and a change would be an improvement, although a return to the original “erythroxyline” would be still better.

The German Pharmacopeia Commission has proposed the following description and tests for it :

Cocainum Hydrochloricum —A white crystalline powder of a weak acid reaction and slightly bitter taste, which produces a characteristic transient anæsthesia of the nerves of the tongue. It is easily soluble in water and in alcohol. It is likewise dissolved by nitric, hydrochloric and sulphuric acids, the latter causing a frothing. A solution of iodine produces in its aqueous solution a brownish red precipitate ; the caustic alkalies produce a white crystalline precipitate difficultly soluble in water, but easily so in alcohol and ether.

Incinerated on a piece of platinum foil, cocaine hydrochlorate should leave no residue ; it should be soluble without residue in double its weight of cold water, and should impart no coloration to mineral acids.

The experiments of Koller were made with a 2 per cent solution, but experience has shown that for general use, a 4 per cent solution is preferable. In some cases stronger solutions are required, particularly in the nose, pharynx and larynx, although repeated applications of a 4 per cent solution will often obviate the necessity of using the stronger ones. In some of the stronger solutions a more perfect solution may be obtained by the addition of a few drops of alcohol.

The aqueous solutions are apt to deteriorate by the growth of microscopic plants which are nourished by the alkaloid and destroy it. These growths, which, commencing within a week and increasing with some rapidity, may, when applied locally, produce severe inflammatory symptoms, are prevented by carbolic acid, the aromatic series, salicylic and boric acid, according to Squibb. Salicylic acid seems, on the whole, to be the best and most certain protective agent, and a good rule in making up solutions is to take one-half water and the remainder of a saturated solution of salicylic acid. This gives about one six-hundredth part of salicylic acid to the solution of the alkaloidal salt, a proportion which, while it is a sufficient protective, can hardly be objectionable in any way.

A still better method is to keep the salt in its crystallized state, preserved in capsules containing one grain each. An extemporaneous solution of the contents of such a capsule in a half dram of water, made in a moment when it is to be used, will provide with certainty a fresh and pure solution of nearly 4% strength.

A solution of the alkaloid in olive oil is serviceable for application

to the eye for recent abrasions from burns and other painful affections of the cornea. Moreover, it is not as easily carried off by the lachrymal secretions. It is of value as a lubricator in catheterizing sensitive canals—the urethra, cesophagus, trachea, etc.—and as an application in burns and superficial excoriations. The alkaloid is readily dissolved in oil by the addition of gentle heat in a water bath. Cocaïnized oil in a 5% solution can be obtained in the market. Oleate of cocaïne would seem to meet the same indications. Bignon prefers cocaïnated vaseline for all external applications.

Gelatine discs impregnated with the hydrochlorate have been found by Joseph W. Warren to be of great convenience in the eye and in other moist cavities. The drug is also exhibited in the form of a spray, by inhalation and by insufflation. Eugene Smith considers the spray to be by far the most efficient mode of application to the eye. A spray-producer has been devised by Dunn expressly for use with cocaïne solutions.

On all mucous membranes and on the cornea the topical application of a solution with a brush, spray or pipette will produce satisfactory superficial anæsthesia, but where anæsthesia of the skin or deeper parts is desired, it must be administered hypodermically. Bradford is the authority for a method of rapid cocaïnization of the eye by the instillation of a single drop of an 8 per cent solution at intervals of a minute. He was able to perform severe operations at the end of three minutes.

J. Leonard Corning, relying on the hypothesis that some time is required for the diffusion of the drug through the capillaries and that when the terminal filaments of the sensory nerves, which ramify in the saturated tissue, are exposed for a sufficient length of time to the influence of the cocaïne, changes are induced in the nerve substance to an extent sufficient to interfere with conduction, causing local anæsthesia—relying on this hypothesis, he concludes that the same current which carries the drug to the nerve filaments will later dilute and carry off the anæsthetic substance; retardation of the movement of the blood from the anæsthetized part would then be sufficient to increase the duration of the anæsthesia. This result is best obtained by exsanguinating the part by Esmarch's bandage a few moments after

the injections of the drug, taking care not to compress the tissues immediately above the points of injection, and applying the tourniquet at a point on the lines beyond or within the site of the injections. By this method operations of considerable magnitude can be performed, although its application is apparently confined to the extremities, where compression can be obtained. It is believed that it will even be sufficient for amputations.

ACTION OF COCAINE.

Cocaine has a powerful local anæsthetic effect on the skin, mucous membrane, the eye and deeper structures. Laborde has found that the injection of one centigramme of the sulphate of cocaine in a 1 per cent solution produces greatly exaggerated movements in a Guinea pig, which are accompanied by anæsthesia, most distinct in the posterior extremities. A repetition of the dose, a few moments later, causes the movements to become wild and violent, while anæsthesia is present over the entire skin, although the conjunctiva apparently retains its sensibility, and the pupils are dilated; convulsions, both tonic and clonic, soon appear, contractions of the anterior extremities and of the muscles of the eye, evacuations of greenish fæcal matter and frequent micturition, passing into a condition of tonic opisthotonos. After a variable time this condition may disappear; to recur again until the animal finally appears to be entirely paralyzed, although again to be convulsed, and finally to completely recover, although the insensibility of the skin may last for forty-eight hours after the injection.

Von Anrep held that the convulsions were of cerebral origin, and arrested by section of the spinal cord. Dannini found that section of the cord did not arrest convulsions in the hind feet, and still other observers have reported that they were produced and continued after the medulla was divided, the question still remaining a mooted one.

The drug causes cerebral excitement and partial paralysis of sensibility in small doses; in larger doses cerebral excitement, complete paralysis of sensibility, tetanic spasms and death. There is paralysis of the posterior column of the cord and of the entire system of peripheral sensory nerves, although the anterior columns and the peripheral motor nerves are not paralyzed according to the extensive experiments of Alexander Bennett.

The depression of the irritability of the sensory nerves is preceded by a stage of increased functional activity. It would also seem that both the motor and sensory fibres are finally depressed, but that the action upon the motor is subordinate to that upon the sensory nerves.

It is held by some that the action of cocaine is exclusively local and anæsthetic, from the chemical affinity which it exerts through its presence in the tissues. The experiments of Halsted and Hall, showing that the injection of a drug in the course of a nerve anæsthetizes the parts to which it is distributed show that its action is centripetal, and probably due to inhibitory phenomena.

Pallor of the face, faintness, vertigo, syncope, and even slight convulsions have sometimes been observed to an alarming extent after the use of cocaine, and by Dujardin-Beaumetz they have been attributed to cerebral anemia. As poisoning is produced only by very large doses, these symptoms are hardly to be feared. Moreover it is possible that they may arise more from the hysterical apprehension of the patient, or possibly from some mental idiosyncrasy than from the effect of the drug.

Ziem, of Dantzic, in addition to a case reported by himself, has collected seventeen cases from ophthalmological literature, in which alarming effects have followed the local use of cocaine.

In three it was injected hypodermically, and in fourteen dropped into the conjunctival sac. The cases have been described by Peck (1), Mayerhausen (1), Stevens (1) Reich (2), Knapp (3), Heuse (4), and Bellarminoff (5). In some cases the symptoms have been transient, consisting of pallor of the face, giddiness, and sweating of the face or neck; in others there have been dyspnœa, great feeling of prostration, malaise and apathy, lasting sometimes for several days. Vomiting and headache have been rarely present. In one case the application of fifteen drops of a 2 per cent solution to the conjunctiva was followed by tottering gait, difficulty of speech, confusion of the mind, and extraordinary restlessness; and, in another, the subconjunctival injection of about eight drops of a 3.5 per cent solution produced convulsions and loss of consciousness. The strength of the solution used was 4 per cent in eight cases, 2.5 per cent in four, and 2 per cent in three or four others. The quantity generally varied from

two to four drops. The subjects were, in some cases, feeble aged women; in others they were strong and healthy individuals, both male and female.

The influence of the alkaloid upon the heart is, according to Beyer, exceedingly prompt and uniform; in small doses, it is a powerful stimulant to the heart's action; in medium doses, it has an inhibitory influence upon the ventricular contractions; and in large doses it produces diastolic arrest from which, however, the heart may be recovered under suitable conditions. A rise in the blood-pressure consequent upon the administration of cocaine is due to the direct action of the drug on the heart and blood vessels, stimulating the former and constricting the latter; a fall in blood-pressure, coming on after the rise, must be accounted for by the action of the drug on the heart alone since its constricting influence on the blood-vessels outlasts the stimulating influence on the vagus endings and also on the endings of the accelerator nerves of the heart, but has no stimulating action on its muscular substance. Other authors hold that a rise in arterial pressure is due to the contraction of the arterioles produced by the stimulation of the vaso-motor centre in the medulla, since Dannini has found that after section of the cord, cocaine is powerless to increase arterial pressure, and Ott that when the cord is cut in the cocaineized dog, the pressure falls to the level which it usually occupies in the unpoisoned animal. Whatever the cause may be the fact remains that the vessels are constricted by the application of cocaine.

Some observers have found no effect at all from cocaine upon striated muscles, but Biggs' experiments on the frog show that large doses diminish their excitability and those of Ott show that muscular contraction is prolonged.

The respirations are slightly increased in number at first, when the alkaloid is administered in small doses, and then diminished; by larger doses, they are rapidly decreased from the first, resulting in death by arrest of respiration.

Von Anrep observed that intestinal peristalsis was notably increased by moderate doses. The increase is followed by great sluggishness, deepening into paralysis after large doses.

According to Moreno it is eliminated by the kidneys. The secre-

tion of the urine and the elimination of urea is diminished, rendering it probable that tissue waste is decreased.

The skin temperature is elevated from the beginning and there seems to be a rise in the rectal temperature preceded by a fall, the elevation attaining the maximum during the convulsive stage.

Very large doses are required to produce death. Laborde places the fatal dose at 11 milligrammes for each kilogramme of body weight. A case is on record where twenty-two grains were taken with no permanent injury. When a toxic dose is taken, according to Laborde, the respiration is at first slowed, then accelerated, finally becoming irregular, frequent and intermittent, and in the last stage of the poisoning the respiration is again greatly accelerated, and death occurs in convulsions from asphyxia, while the heart may still beat regularly though feebly for one or two minutes longer.

APPLICATIONS OF COCAÏNE.

The drug is found to be useful as a stimulant in cases of bodily exhaustion, in digestive troubles, in the cachexiæ, as an aphrodisiac, in asthma and laryngeal phthisis, in the morphine, opium and alcohol habits, and as a local anæsthetic. It also has a decided hæmostatic action and in strong solution possesses marked antiseptic properties. Its anæsthetic action depends greatly upon the quantity and quality of the salt used.

GENERAL AND MINOR SURGERY.—Cocaïne has positive value in all operations upon superficial parts not requiring too much time, and it is probable that even this limit may be removed by Corning's method in operations upon the extremities. In cases of tenotomy for the relief of wry neck and other deformities, in operations for enlarged burse, tapping, injection of irritable matter, and excision, its use is indicated. In the removal of small tumors it has been shown to be efficient—in fatty and glandular tumors; cancerous ulcers and small tumors can be removed painlessly with arsenical paste and cases of excision of scirrhus and epithelioma from the face, breast and other parts have actually been reported. The case of General Grant, where it was of the greatest value in mitigating the pain of an epitheliomatous cancer of the base of the tongue, will occur at once to the reader.

In superficial plastic operations, particularly upon the face, in the removal of needles, bullets and other foreign bodies it affords great relief.

Fractured and dislocated bones may be examined and their displacements reduced painlessly through injections of cocaine made deeply at the site of the lesion (Conway). In other departments of bone surgery it has also been found useful. M. J. Roberts has reported a number of cases operated upon by Corning's method and the injection of cocaine into the skin, the soft parts and under the periosteum. It is applicable in relieving the pain in scraping away carious and excising necrosed bone, and in osteotomy for the relief of deformity, operations for which have been done by Roberts and Stillman. Its use in opening abscesses and other inflammatory tumors, carbuncles, paronychia, etc., would occur at once to the surgeon.

In relieving the pain of burns or scalds it has marked power, as well as in rendering painless the use of the thermo- and galvano-cautery. It will afford ample anæsthesia for operations upon the fingers and toes and for amputations of these lesser members if not for the major amputations. It is believed, however, that if the method of Corning be adopted it will be ample for all amputations, excisions and resections in the continuity of a limb. In the troublesome and painful little operations for ingrowing toe nail, many operators have found that it relieves all pain. In phlebotomy, vaccination, introducing trocars, and even in the ligation of arteries it will fully meet all indications for anæsthesia. In relieving the pain and reducing the inflammation of erysipelas it will be of value; and it has been found of service in cases of painful acute eczema, in relieving the pain of epilation, when rubbed in in the shape of the oleate, and Waugh has found it efficacious as a hæmostatic in a case of purpura with repeated hæmorrhages from the lips and gums where all other applications had failed.

GENITO-URINARY SURGERY.—The pains of gonorrhœa in both sexes and of chordee are relieved by the application of a cocaine solution, and it is claimed by some that the secretion is diminished. It is certainly efficient in relieving the pain attending the introduction of sound or catheter into a hyperæsthetic urethra. Rapid dilatation of urethral stricture, meatotomy and urethrotomy, both external and internal, are

rendered painless by the application of cocaine solutions. Caustic injections are relieved from pain by the same means. Condylomata can be painlessly cauterized, excised and scraped out with its aid, and the application of caustic in the treatment of venereal sores is relieved of pain. The suffering connected with the opening of a suppurating bubo is removed. Malcolm McLean has operated under the influence of a cocaine solution locally and hypodermically, upon a large and painful hydrocele, complicated with inguinal hernia, cutting into the tunica vaginalis and excising a considerable mass of thickened membrane, all without pain. It is indicated in catheterism, endoscopy, spasmodic retention of urine, prostatitis, lithotripsy and plastic operations on these organs and the application of caustics in venereal disease. Godson performed, without pain, under a 20 per cent solution, two operations for the removal of vascular growths from the female urinary meatus. Irritable bladder and urethra, and spasm of the sphincter vesicæ are relieved by local application.

It has been used in numerous instances to facilitate operations of litholapaxy with great success, and Weir has even expressed his belief that it would be sufficient for lithotomy. It is certainly of value in dilatation of the female urethra for the removal of calculi. It will be of value in strangulated hernia, both in affording relaxation of the tissues and anæsthesia for operation.

In preputial operations it is of great service. Milne has removed a tumor from the prepuce of an infant $2\frac{1}{2}$ months old, and in many cases it has relieved the pain connected with the detachment of adhesions of the prepuce. In the hands of numerous operators the hypodermic injection and local application of a 4 per cent solution have relieved the pain of circumcision.

Its value in affections of the rectum and anus is marked, from relieving pruritus ani to furnishing sufficient anæsthesia for the removal of growths from the rectum. It is indicated in rectal tenesmus and spasm from fissure or other causes, and is of value preliminary to the introduction of the rectal speculum, dilatation or cauterization of fissure. In fistula it affords ample anæsthesia for operations, and its service in all operations for the relief of hæmorrhoids is undeniable, as well as in case of reduction of prolapsus ani and the removal of vegetations.

GYNECOLOGY.—*Pruritus vulvæ* is allayed by the application of a cocaine solution, as well as the pain from fissures or excoriations at the vulva and the sensitiveness in spasm of the vulva. McLean removed a cystic tumor as large as a hen's egg from the labium minus absolutely without pain. The pain of vulvitis is mitigated, the opening of abscesses and cauterization of the vulva and the removal of the remains of the hymen are rendered painless.

In vaginismus the drug is highly useful from the fact that the reflex excitability of the vaginal orifice is diminished. Loewenthal removed a cancerous tumor of the vagina with the Pacquelin knife, using the actual cautery to arrest the hæmorrhage, with but little pain. Operations for fistulæ, vesico-vaginal, urethro-vaginal, recto-vaginal, etc., can be done without pain and with the active coöperation of the patient. Operations for lacerated cervix without pain are reported in numerous instances, and in these cases the solution should be exhibited both topically and by injection into the cervix. Polk has applied the actual cautery to carcinoma of the cervix extending to the vagina under cocaine. Blamely has found the local application of cocaine efficient in a case of ulceration and erosion of the os uteri and granular vaginal mucous membrane, where general anæsthesia had previously been necessary in order to introduce a speculum. It is also of value in introducing a sound or using the curette in the uterine cavity. Topical application to the cervix, the vagina, and vulva at the proper time with hypodermic injection into the cervix, as it dilates, very markedly diminishes the pains of labor. It has been found to be of value in performing perineorrhaphy, in tapping ovarian cysts, or in any explorative puncture.

Under the influence of a solution of cocaine locally applied, women subject to sore nipples are able to nurse, the soreness is relieved, and fissures, if not too deep, heal rapidly. Its use is advisable whenever the nipples are sensitive, in order to prevent fissures, which are often due to a shrinking movement of the mother when the child seizes the breast. It is of great value in rendering the opening of abscesses of the breast painless. Small tumors of the breast may also be removed under its influence.

THE EYE.—Following the line of Koller's experiments after the

demonstration of Brettauer, the drug was taken up with great enthusiasm by ophthalmologists. On the instillation of a 2 per cent solution into the conjunctival sac, a sensation of warmth is first felt, with an increase in the quantity of the lachrymal secretion; these disappear in about a half minute and are succeeded by a sensation of dryness of the eyeball; in from three to fifteen minutes sensation, both tactile and painful, is suspended in the conjunctiva and cornea, and the palpebral aperture appears to be widened. Complete anæsthesia lasts from seven to ten minutes, after which time sensation is slowly recovered, normal sensibility being regained after a period varying from a half hour to an hour and a half. During the period of complete anæsthesia all reflex irritability is abolished, the cornea and conjunctiva can be freely handled and blepharospasm and profuse lachrymation, its usual concomitants, are absent. Intra ocular tension is slightly decreased.

From five to twenty minutes after the instillation the pupils begin to dilate, attaining the maximum in from thirty to forty minutes, remaining stationary for about an hour, and gradually diminishing, the dilatation disappearing in a few hours more. Grove places fourteen hours as the limit of action of a 1 per cent solution and twenty-four hours as the limit of a 4 per cent solution. He also observed that the drug had a different effect upon irides of different colors, the dilatation not beginning in dark brown eyes until from ten to twenty minutes, usually about fourteen, while in the blue it never required more than ten minutes. The mydriasis is never extreme, but is sufficient for ophthalmoscopic examinations, and atropine will need to be used where extreme dilatation is desired. Observers vary as to the source of the mydriatic action, some holding that it is due to the presence of hygrine, but the balance of opinion seems to incline to the conclusion that it is inherent in the cocaine itself. Jessop considers it to be due to the local action of the cocaine as an irritant on the terminations of the cervical sympathetic nerve. This view is supported by the observations of Snell, that under general anæsthesia the pupil dilated by cocaine promptly contracts to its normal size.

The accommodation is affected to the extent of a shortening of the range and a slight recession of the near point, being reduced, but not

paralyzed. Knapp observed that the near point began to recede within twenty minutes after dropping a 4 per cent solution into the eye, increased for about the same period, after which it diminished. The accommodation not being paralyzed, the unpleasant feeling of blindness, resulting from atropine, is not produced. Bradford has observed that the mydriasis and effect on accommodation can be neutralized without danger by a mixture of ten drops of a 5 per cent solution of pilocarpine in a drachm of 4 per cent solution of cocaine.

Pallor of the conjunctiva, whiteness of the sclera and anemia of the posterior vessels are observed and attributed to the constriction of the vessels.

Perfect solutions have no appreciable effect upon the healing of wounds of the conjunctiva or iris, but it has the beneficial effect of all mydriatics upon the cornea, though to a less extent than atropine. The observations of Lucien Howe show that imperfect solutions produce a slight additional hyperæmia of the conjunctiva, and a perceptible abrasion of the epithelium of the cornea, delaying the healing process but slightly.

Mode of Application.—To secure anæsthesia of the eyelid the drug should be applied to the palpebral conjunctiva as for superficial operations upon the bulbar conjunctiva and the cornea, and three or four drops of an 8 per cent solution should be injected into and underneath the skin. Superficial anæsthesia of the eye is obtained by instilling three or four drops of a 4 per cent solution into the conjunctival sac, which has already been washed out with a 1:20 solution of boric acid. Three or four instillations of the same amount should follow during the next fifteen minutes and the first incision should be made immediately after the last instillation. The instillations should be repeated at intervals of five minutes during the operation. The use of a spray is of advantage here in applying the solution rather more effectively and rapidly than by instillation. In case the iris is to be incised, re-instillation should be made after the anterior chamber is opened, to secure the direct contact of the anæsthetic agent. Deeper structures are reached by injection with a hypodermic syringe. Reference has already been made to Bradford's method of rapid cocaïnization. Every

possible operative procedure upon the eye or its appendages has been successfully performed under the influence of the drug.

THE EAR.—Although the indications for the use of cocaine in aural surgery are not as many nor as marked as in ophthalmology, it is an important adjuvant to the therapeutics of the ear. In operations upon the auricle and external auditory canal, it is valuable as a hypodermic injection, while it is serviceable in controlling the pain of ulcers and granulations of the external meatus, applied locally. In tinnitus aurium a number of cases of relief by cocaine are published and Zaufal believes that he has obtained true anæsthesia of the tympanic membrane; acute myringitis has been relieved by the instillation of a 4 per cent solution. In otitis media a number of cases have been relieved from pain by the instillation into the external meatus, and still others by the insufflation of a solution through the Eustachian tube and by spraying the nares and then inflating the tube by Valsalva's method. It is proper to say, however, that Holt and others believe that, while cocaine relieves the pain and for a time holds the inflammation of otitis media in check, the congestion returns and is even prolonged after the effect of the remedy has passed off. Granulations of the middle ear were removed in two cases by Zaufal.

THE MOUTH AND PHARYNX.—The sensibility of the buccal and pharyngeal mucous membrane, including the tongue, and also the faculty of taste, are suspended by the application of cocaine. It is of great service in the operations for hare lip and in wounds of the mouth and promises to be of decided advantage in dental surgery.

Halsted and Hall found that the injection of a solution in the line of the sensory nerves of the teeth rendered the extraction of the teeth supplied by them painless.

The surgical treatment of salivary fistula is aided by the drug, as are operations upon the cheeks, such as that of the removal of a tumor from the inner surface of the cheek, which was accomplished without pain by Wyeth. The same surgeon also operated successfully for congenital cleft of the soft palate by painting a 4 per cent solution along the edges of the fissure, renewing the application every five minutes until the operation was completed.

It is useful as a palliative application in aphthæ and in ulcerations

of the tongue. Lower was able to stitch up a wound of the tongue in a child without pain. The pain and dysphagia of severe tonsillitis are temporarily relieved by cocaine applied locally, and its effect is highly beneficial in syphilitic tonsillitis, in stomatitis mercurialis and difficult deglutition. Phillips found it of service in tonsillotomy in lessening the hæmorrhage, abolishing the choking sensation and relieving pain. Its advantage in the surgical treatment of retro-pharyngeal abscess is evident; cauterization in pharyngeal catarrh is rendered painless under the application of an 8 per cent solution and the topical application of the drug to the pharynx prevents dyspnoea in tubage or catheterism of the œsophagus. The same procedure is of value in relieving the dysphagia of pharyngeal phthisis.

THE LARYNX.—It may be broadly asserted to be of the most positive value in all painful affections and operations of the larynx. As with the pharynx, the dysphagia from phthisical ulceration or inflammation of the larynx is readily temporarily relieved by cocaine. The best time for swallowing seems to be about five minutes after the application of the solution; phthisical cough has been relieved by inhalation and the irritable throat of phthisis has been soothed by the application of a 2 per cent solution.

Laryngoscopic examinations where, as in the majority of cases, the mirror is badly borne, are greatly facilitated by penciling the anterior and posterior surfaces of the soft palate, the posterior wall of the pharynx and the base of the tongue with a 20 per cent solution, repeated after a minute if necessary. That the removal of polypi and papillomata of the larynx is greatly facilitated is evident from the number of cases removed without any spasm of the muscles and without any sensation on the part of the patient after the fauces and trachea had been brushed with a solution of cocaine. It renders tubage of the larynx almost free from discomfort and Kohler sounded and even dilated the trachea under its influence. The spasms of chronic asthma can be relieved by painting the faucial mucous membrane with a solution, as has been done by S. E. Post.

THE NARES.—Upon the nasal mucous membrane cocaine has the usual anæsthetic effect, and, what is of fully as great importance, by the constriction of the vessels which it produces, it causes the col-

lapse of an engorged and swollen nasal mucous membrane. This is the source of its power over coryza and hay fever, many cases of which are relieved, although not cured, by its local application. Its influence over the nerve endings is seen also in the relief afforded in asthma and asthmatic coryza. Infantile coryza, or "snuffles," is also relieved by it. By suppressing venous congestion of the mucous membrane and by preventing reflex spasm it aids greatly in rhinoscopic examinations. By preventing secretion, hæmorrhage and sneezing it facilitates the employment of edged instruments within the nasal cavity and renders easy the removal of nasal polypi and the application of the cautery. Jarvis has removed portions of a deviated nasal septum and also portions of the turbinated bodies without pain and with but little hæmorrhage.

From this general retrospect the large and important place which has been established for cocaine within the year following its first public demonstration at the Heidelberg Congress is apparent.

As the sum of the whole, it may be said that, so broad is its application, and so frequently is it indicated by reason of its power to substitute ether and chloroform, and thus to do away with the disadvantages and dangers of these drugs, added to the fact that the patient is continued in consciousness while pain is prevented, it occupies the position of an ideal anæsthetic more nearly than any other drug now known.

JAMES E. PILCHER.

EXTIRPATION OF THE LARYNX.

In addition to the recent American cases of extirpation of the larynx, contributed to the present number of the ANNALS OF SURGERY by Drs. Gerster, Park and Lange, another important contribution to experience in this operation will be found in the last issue of Volkmann's collection of clinical lectures,¹ by Dr. Eugene Hahn, Surgical Director of the Friedrichshain City Hospital of Berlin. In this publication the author gives eleven cases of his own, never yet published, although some of them were mentioned at the last Congress of German Surgeons, and have been included in some recent statistical reviews on the subject.

He also publishes a complete list of all the operations for removal of the larynx thus far communicated, comprising in all ninety-one cases. The author then proceeds, after making some critical and statistical remarks on the cases, to detail his own methods of operating with the use of his sponge-tent-canula. The whole is preceded by a short historical sketch.

As to his own operations for extirpation of the entire larynx, eight of the eleven were indicated by carcinomatous and one by a sarcomatous growth. In three of these cases local recurrence was observed; in none did any infection of the lymph-glands or surrounding tissues by metastasis occur. The author, therefore, believes carcinoma of the larynx to always indicate treatment by removal of the entire larynx at as early a period as possible and without regard to age, provided the health of the patient will permit of such an operation. Bronchial and pulmonary catarrhs, however, contraindicate the operation; while removal of half of the larynx only may be indicated by any of the following conditions: (1) recurrent papilloma that cannot be removed by other means; (2) stenoses and obliterations of the larynx, which cannot be treated by dilatation or incision; (3) malignant tumors of lim-

¹Ueber Kehlkopfsextirpation, von Eugen Hahn. *Volkmann's Samml. klin. Vorträge*, No. 260.

ited spread that have not affected the cartilages nor the neighboring tissues, especially those cases of superficial cancers of slow growth ("cancroids").

Calculating the mortality-percentage from the ninety-one tabulated cases the author allows 44% for total and 13.7% for partial extirpation. Seventy-two of the operations were performed for cancer, and of these seven were only partial. Twenty-five of these cases died during the first two weeks, mostly of pneumonia and septic bronchitis, and five during the period between the third and the seventh week. The mortality percentage, however, has somewhat improved of late, owing to technical advances. Death from recurrence of carcinomatous disease occurred twenty times in sixty-five cases, each time within a period of nine months—which is, however, too short a time for observation. Only thirteen of these sixty-five may be considered complete cures, although even this proportion may prove too large.

Extirpation of the entire larynx on account of other tumors shows better results. Of such cases none died from the effects of the operation itself. Six of the nine cases recovered. Two died from recurrence of sarcomatous tumors, one from tuberculosis. Two patients died after the same operation for perichondritis and stenosis, which leads the author to favor the partial extirpation for these affections.

Partial extirpation for cancer was successful in three out of seven cases. The operation itself for removal of the entire larynx is to be considered as very dangerous, 31% of the patients died from the effects of the operation alone. But the author believes this state of things capable of improvement by technical advances, and calls attention to the fact that of the eleven patients operated upon by himself only one died, who might have been saved as well. In fact the present technical improvements are well calculated to encourage the performance of the operation, contrary to the view expressed by Solis-Cohen, whose proof that the operation does not tend to lengthen life now no longer hold good in all cases. Such an improvement, to which the author attributes his successful results, he holds the use of his sponge-tent-canula to be.

Pneumonia and bronchitis, the immediate causes of death after operation, are best avoided by a complete occlusion of the trachea dur-

ing operation. In this way infection of the air-passages can be prevented, and, consequently, the lung-affections. The sponge-tent-canula, which the author prefers to Trendelenburg's inflatable one, differs from the usual double tracheotomy-canula in so far as the inner tube is longer, projecting out from the wound and curving downwards. This arrangement facilitates the operation by removing the manipulations necessary for the administration of the anæsthetic away from the field of operation. The outer canula is provided with a projection at the distal end—the tube being simply of greater thickness here—to prevent the sponge from slipping off. The entire length of the outer tube down to the projection is covered with antiseptic sponge, which has been saturated with iodoform by means of an ether-solution, and then dampened with water and pressed, and which is sewed and tied on with silk. After introduction of the canula the sponge expands and securely occludes the trachea, without causing any ill effects. The author has frequently used this canula, and always with the most satisfactory results. Only once death occurred after its use, when the canula had been introduced into the mediastinum by mistake.

After some remarks concerning the anatomy of the parts the author proceeds to detail the mode of performing the operation and the after treatment.

Partial resections for stenosis, etc., are to be made either on the anterior or on the lateral aspect of the larynx, and without destroying the perichondrium. If the cricoid cartilage is to be removed the posterior portion had better, if possible, be left in situ, to support the arytenoid cartilages.

In cases of neoplasms which necessitate complete removal of the larynx; a longitudinal incision in the middle line is recommended, reaching from the third tracheal cartilage to midway between the thyroid cartilage and the hyoid bone, to which two lateral incisions, parallel to the lateral cornua of the hyoid and verging to either side, are to be added, and the flaps thus formed folded back together with the sterno-hyoid muscles after their division. After determining how much is to be removed, the superior and inferior thyroid arteries are to be doubly ligatured, and if necessary the superior laryngeal, or even the hyoid branch of the lingual artery, as well; and then the larynx, to-

gether with the sterno-thyroid and thyro-hyoid muscles, may be removed either from above, by first dividing the connections with the hyoid bone, or from below, by first severing the cricoid cartilage from the trachea, with small loss of blood. Care is required in dissecting the laryngo-pharyngeal muscles off from the thyroid cartilage, so as to avoid injuring the carotid, which is best done with curved scissors.

In case the tumor has only affected the internal portions of the larynx, the larynx is to be anteriorly divided longitudinally (*laryngofissura*), the vessels being previously ligatured, or tamponade used to control the hæmorrhage, before the mode of operation is finally decided upon.

If total removal is indicated, the author prefers to remove the cricoid cartilage entire, to facilitate which he does not divide it. Whether or not the epiglottis is to be removed depends only upon the extent of the morbid growth.

As to the after-treatment, the wound, after complete arrest of the hæmorrhage, is to be packed with antiseptic gauze; a soft rubber tube to be introduced into the stomach, and the patient to be supported in a sitting posture.

The sponge-tent canula may be removed after twenty-four hours and afterwards common canulæ wound about with iodoform gauze may be used and changed every twenty-four hours, when the wound is dressed. Some patients are able to swallow on the fourth day after the operation, others cannot do so until after eight weeks. The patients generally soon learn to speak if only half the larynx has been removed. In total extirpation Gussenbauer's artificial larynx may be introduced after two to five weeks' time.

LEWIS S. PILCHER.

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. Experimental Researches on the Etiology of Suppurative Phlegmons in Man. By DR. JOSEPH PASSET (Munich). During the year 1884 the author examined in the bacteriological laboratory of Munich thirty-three cases of acute abscess occurring in man by cultivating the micro-organisms found in them, and testing their action by inoculating them upon animals. He published the results of these experiments in a condensed form in the *Fortschritte der Medicin* early in this year (1885) and has now edited full particulars in pamphlet form. As a soil for cultivation he used an 8 per cent slightly alkaline peptonized gelatine prepared with infusion of meat, and a soil consisting of 1,000 parts of water, 20 of peptone, 10 each of common salt, extract of meat and agar-agar with sufficient carbonate of soda to counteract the acidity; and, in addition to these, also coagulated ox-blood-serum and sterilized potato slices. In all details Koch's methods were followed.

The author does not lay claim to having added anything new to the knowledge of the etiology of certain kinds of subcutaneous suppurative inflammation; Ogston had found (1880) micro-organisms in pus, classified them and regarded them as the cause exciting inflammation; and Klebs, Lister, Kocher, Koch, Pasteur and others (Becker, Garré) had confirmed this opinion.

Rosenbach, who published his researches on the same subject only a few months before the author had concluded his experiments, treated the subject in a very similar manner—and the results of the present author must be regarded as in the main corroborating the statements of Rosenbach. They both found the staphylococci (Ogston) and streptococci (Billroth) most frequently represented, but while Rosenbach only found two kinds of the former (*staphylococcus pyogenes aur-*

eus and *st. p. albus*) the author found a third kind in addition to these, the *st. p. citreus*. The streptococcus found by himself the author does not believe to be identical with the one found by Rosenbach. The author furthermore found a new micrococcus which somewhat resembles Friedländer's pneumonia-coccus, and, besides this, organisms which he calls *bacillus pyogenes fetidus* and *staph. cereus albus* and *staph. cereus flavus* respectively; but he did not find Rosenbach's *micrococcus pyogenes tenuis*.

The conclusions which the author draws from his researches are, that since the most usual cause of acute suppuration is the presence of micro-organisms in the tissues, as Ogston first asserted, the most frequent forms present in such suppurations are the different kinds of staphylococcus pyogenes, but that other forms may occur as well, especially the streptococci. The most different forms of suppuration, from a simple furunculus to an acute osteomyelitis, from the slightest subcutaneous accumulation of pus to pyæmia causing death, may each be due to one or other of these two forms. The author, indeed, believes that the only reason why these agents should cause different affections is that they are, in each case, differently localized, or introduced into different kinds of tissue.

He found staphylococci repeatedly in putrefying meat, rinsings of dishes, etc., and believes that handling these articles may easily lead to the introduction of the germs beneath the skin, calling forth whitlows, felons, etc.

The special action of the bacteria in calling forth suppuration, the author believes to be a chemical one and corresponding to the suppuration after introduction of irritants, such as turpentine and croton oil (Orthmann, Councilman), under the skin. The chemical irritant may either be an excretion of the micro-organisms or result from a decomposition of the tissues by their action.

The treatment of phlegmonous inflammatory processes with ice is justifiable, in the author's opinion, in order to gain time for the organism to strengthen itself to battle against the infection, for cold prevents their development during the time of its application. Boiling water, however, would be more efficacious. But if suppuration is inevitable moist warmth and early incision is advisable. Hypodermoi-

injections of a one-in-thousand sublimate solution and similar injections into inflamed joints are proposed by the author, and one case cited, where acute gonitis (*staph. pyog. albus*), after acute articular rheumatism was cured by aspiration and injection of thirty cubic centimetres of $\frac{1}{10}$ per cent solution of corrosive sublimate.

By far the greater part of the treatise deals with the description of the micro-organisms found and the inoculation experiments.

The *staphylococcus pyogenes* is found singly, or in pairs, between the pus-cells, or imbedded in their protoplasm; and in larger groups in sections of pathological specimens and in cultures. The cocci are not all of the same dimension, their average measurement is 0.87 micromillimetres (μ). The cultures begin to develop in one or two days, are whitish gray in color, and the gelatine is liquefied. The culture begins to grow from the inoculation puncture; on the third day a growth the shape of a lentil appears on the surface; in eight days the whole of the zone surrounding the puncture is liquefied; after three or four weeks the whole is turned into an opaque fluid, which subsequently becomes clarified and emits a sour odor like spoilt starch paste. The sediment is slightly colored at first, more markedly later on, and is white, orange or lemon in the different cultures of *staph. pyog. albus*, *aureus* and *citreus* respectively. Agar-agar-soils are not liquefied. Plate-cultures develop in eighteen hours at the normal temperature of the body. The characteristic colors begin to appear after twenty-four hours. The same observation can be made with blood-serum and potato-soils. If the air is shut off the cultures do not color.

Injection of either of these cultures into the pleura or abdomen of rabbits, Guinea pigs and mice causes death in one or two days; the original cultures can again be obtained from the blood and tissues of the animals. Very similar results follow injections into the jugular veins. The kidneys appear mainly affected, hyperæmia and embolic processes being observed. Inoculations under the skin produce abscesses after two days; injections into joints, purulent inflammation.

The *streptococcus* is found in chains of three, ten or thirty cocci; frequently these chains appear formed of diplococci, or pairs. The size of the single cocci varies; on an average they measure from 0.58 to 0.73 μ . and resemble Fehleisen's erysipelas-cocci. After inocula-

tion the gelatine soil presents, on the second or third day, a delicate light gray halo, two millimetres in size, around the puncture, on the surface of the gelatine. In the gray opacity very minute white dots and points appear, which subsequently grow larger. These points are more prominent if the matter inoculated be very much diluted. On plate-cultures the microbe grows in like manner in spots, dusted with finest points. On blood-serum a line of inoculation develops to a broad band. On potato sections no growth ensued visible to the naked eye. In agar-agar no halo appeared as on the gelatine, the puncture developing simply to a ribbon-like streak, with fine dots visible at the edges. Plate-cultures on agar-agar developed at 37° C. after twenty-four hours as a gray film, consisting of finely granulated irregular spots, which prove to be conglomerations of chains. Later on the lines of inoculation appeared framed in by gray bands, in which again small white specks appeared.

Experiments of injecting cultures of the staphylococcus into animals failed to prove them deleterious; but inoculation by means of a needle, on the ear, produced erysipelatos local symptoms. Fehleisen's erysipelas-cocci, in fact, developed in cultures in an exactly similar manner.

The micrococcus resembling Friedländer's pneumonia-coccus, and called, for short, *pseudo-pneumo-coccus*, at first developed in the media in the same manner as the real pn.-coccus. After twenty-four hours a grayish bright hemisphere appears on the surface of the gelatine and grows in size during the following days. But the course of the puncture shows no development. After three or four weeks the upper part of the gelatine assumes a brown color, the gelatine becomes glutinous and viscid and acquires a foetid odor. The microscope reveals many round cocci and a few oblong ones, some constricted in the middle. Their size varies from 0.87 to 1.16 μ . Plate-cultures present white dots after twenty-four hours, which subsequently develop to light gray prominences, which prove to be colonies, consisting mostly of round cocci with a few longer ones. Blood-serum develops a thin colorless streak, which later on assumes a gray color. On potato slices the pseudo-pneumo-coccus presents a thick white succulent growth without any appearance of bubbles. These cocci also possess capsules

which may be stained, but not always, and not so markedly as in the true variety. Injection of these cocci into the pleuræ produced pleuritis with inflammatory lung symptoms in mice, rats, Guinea pigs, as well as rabbits. Injections into the abdominal cavity caused death by septicæmia, as did also intravenous injections. Inoculations under the skin sometimes produced abscesses in rabbits, rats and Guinea pigs, and acute septicæmia in mice. Inhalations with exsiccated culture matter did not produce pleuro-pneumonia. The pseudo-pneumococcus therefore resembles the true pneumo-coccus in some, but not in all, particulars.

The *bacillus pyogenes fœtidus* is about 1.45μ in length and 0.58μ in breadth, rounded at the ends, sometimes joined to one or more others. In its substance one or two colorless spots may be seen (spores). Their motion, when suspended in liquid, is slow. Colonies present, after twenty-four hours, delicate gray nebulosities with a marginal thickening on the surface of the gelatine, which subsequently spread over the whole surface. The puncture also shows a fine cloud in which small specks and dots half the size of a pin's head appear, especially at the lowest portion. Later on the upper portion of the gelatine is turned into a grayish turbid layer. Gelatine plate-cultures show white spots after twenty-four hours, whitish-gray on their surface, which rapidly grow in circumference and confluate, being thicker in the centre and grayer in the periphery. The same manner of growing is observed on agar-agar. Lines of inoculation on coagulated blood-serum expand to broad and thick grayish-white bands. On cut potato-surfaces glossy, luxuriant, light brown colonies are formed. A fœtid, offensive odor always characterizes the growth; milk, however, does not acquire this odor from the bacillus.

Inoculations on animals were accompanied by different results. Rabbits were not affected by injections under the skin, in the pleuræ, the mucous membrane of the trachea, or the jugular vein, excepting one case of abscess. One mouse died from septicæmia after one day and a half after subcutaneous inoculation with five cubic centimetres; others remained healthy. One Guinea pig died after the same treatment in half a day; another developed an abscess. All the affections were traceable to the presence of the bacilli.

The *staphylococcus cereus albus* forms colonies in gelatine of a white color, resembling drops of stearine or wax. Punctures develop to a grayish white streak finely dusted with points. Gelatine-plates show white dots on the first days, which increase to about two millimetres in diameter. Ox-blood-serum develops light-gray, dull, luminous bands. Potato-cultures are grayish white, of moderate thickness.

The *staphylococcus cereus flavus* resembles the preceding one in growth, but the color soon turns to a lemon tint, somewhat darker in tone than the color of the staph. pyogen. citreus. Both these staph. cerei are not to be differentiated by the microscope. They appear in groups, or singly, each coccus being about 1.16μ in diameter, or in twos, or even in chains. Inoculations had no marked results.

Physiologically considered, all these species have an extended existence. The streptococci live about three months; the others, however, are easily inoculated after a lapse of six months, the staphylococci even after twelve months. Dried up specimens were inoculable after ten days. Cold ($+4^{\circ}$ C.) prevents their growth, but does not destroy them. Temperature of boiling water destroys them.

Experiments with disinfection were also carried out, and the author found that twenty drops of a one in twenty solution of carbolic acid, 100 drops of a one in 300 salicylic acid solution and five drops of a one in 1,000 sublimate solution added to ten cubic centimetres of gelatine soil prevented the growth of the streptococci; the addition of twenty-five drops, 100 drops and six drops respectively of the above-mentioned solutions exercised an inhibitory influence upon the germs.

The gelatine was only liquified by the staphylococci—most likely, in the opinion of the author, by means of the formation of peptone. *Untersuch. über die Ätiologie der eitrigen Phlegmone des Menschen.* Fischer's Verlag, 1885.

HEAD AND NECK.

I. On Hemiglossitis. By DR. PAUL GUETERBOCK (Berlin).

The title applies to an acute inflammation of the tongue affecting only one lateral half of the organ, and probably of neuropathic origin.

It is of rare occurrence, only eighteen or twenty cases having been accurately described hitherto, although the affection was already recog-

nized in the seventeenth century, and has been repeatedly separated from other inflammatory conditions of the tongue, whether confined to only one-half of the organ or not. The author distinguishes between superficial, parenchymatous glossitis and hemiglossitis, and also between herpes linguæ unilaterialis or *hemiglossitis herpetica* and hemiglossitis proper, but believes that the two latter affections resemble each other so closely that they are frequently not to be differentiated.

He publishes two cases of herpetic hemiglossitis, and then proceeds to discuss the nature of hemiglossitis in general, abstracting from clinical facts.

He concludes (1) that the extent of the affection is in many cases restricted to the domain of the fifth nerve in the half of the tongue affected; (2) that in some cases the chorda tympani as well as the lingual branch of the fifth nerve probably participate in causing the disorder; (3) that in no case is the glosso-pharyngeal nerve alone concerned, since the fifth nerve always takes part in the affection; (4) that there are no clinical facts extant which prove an influence of the hypoglossus upon the disturbance; (5) and that the same may be said of the vaso-motor nerves, although, of course, their action cannot be positively disproved; (6) that the disorder probably is analogous to herpes zoster, and consists in some injury done to the nerves in their course, which occasions loss of function, destruction of the tissues, and consequently favors the invasion of infectious matter, and inflammation in all its stages, from the formation of vesicles to suppuration and total gangrene of one-half of the tongue. Direct causes of the affection consist in irritation, arising from caries of the teeth, from false teeth and from abuse of strong spirituous liquors; epidemic influences and action of cold would probably not be confined to one-half of the tongue alone. Herpes zoster of the face in the domain of the fifth nerve, or facial neuralgic disorders, possibly herpes of the tonsils and pharynx, occipital neuralgia and paralysis of the seventh nerve are mentioned as indirect causes of hemiglossitis, although neuralgia sometimes follows the swelling instead of preceding it. The disease attacks male adults almost unexceptionally; but the author believes the idea that the left side is generally affected to be erroneous.

The clinical course of the disease cannot be satisfactorily portrayed.

The swelling of the one-half of the tongue may be slight or so great that the whole organ protrudes through the mouth, rendering nutrition and respiration difficult. The tumor appears greater on the under surface of the tongue, and the mucous membrane is highly cedematous. Abscesses are rare, and gangrene yet rarer, but ulcerations frequently occur. The submaxillary glands and the floor of the mouth are sometimes, but not always, swollen. Impairment of tactile sensibility and of the sense of taste, as well as hyperæsthesia, occur. Neuralgic disorders are more frequent. Once epistaxis was observed.

The prognosis is favorable. No case of death is recorded. The affection generally lasts a few days, at most ten or fourteen days, and passes over as quickly as it came. The treatment does not differ from that in allied affections.—*Deutsch. Zeitschr. für Chirurg* Bd. Hft. 3 and 4. 30 July, 1885.

II. On the Surgical Treatment of Synanche Contagiosa (Epidemic Diphtheria) With Special Reference to the After-Treatment of Incision of the Trachea with Salicylic Acid. By Dr. PAUL BLUMBERG (Baku). The author believes that the varying results and the differences in estimating the indications in cases requiring tracheotomy to be due to the confounding of the three diseases, *synanche contagiosa*, croup and *angina diphtheritica*. He therefore tabulates the points in which these diseases differ from each other. He believes croup to allow of a favorable prognosis concerning tracheotomy; diphtheritic angina does not call for operative treatment, except in cases complicated with œdema of the glottis. In diphtheria he believes the operation of little value, especially if suffocatorial paroxysms have appeared; and fears to bring it into disrepute. But he is in favor of early tracheotomy, in children under 7 years of age, as soon as hoarseness, expulsion of croupous membranes and difficulty of breathing have set in.

He gives a case which ended in death twelve days after the operation; death ensued from kidney disease. He used a spray of salicylic acid, and believes that this was of service in clearing up the lung-mischief. He had previously lost seven cases. One case in which he, as consulting surgeon, advised tracheotomy, recovered.—*Deutsch. Zeitschr. für Chirurg*. Bd. 22. Hft. 5 and 6. October 6, 1885.

W. W. VAN ARSDALE (New York).

III. Intubation of the Larynx. By F. E. WAXHAM, M.D., (Chicago, Ill.). Gives the history of four cases in which intubation of the larynx was practiced for the relief of the dyspnœa of croup. The method used was that of O'Dwyer, with tubes constructed for the purpose. The child is held firmly in a sitting posture on the lap of the nurse with the hands at the side, while an assistant holds the head firmly somewhat backward. The gag is introduced between the teeth well back in the left side of the mouth, the assistant holding it with one hand. Guided by the index finger of the left hand, the tube is introduced with an instrument devised for the purpose, which is then withdrawn; if the tube is in place a silk loop which had been attached for the purpose of withdrawing it if it had penetrated into the œsophagus, is withdrawn. Of Waxham's cases but one recovered, the others dying respectively after thirty, thirty-six, twenty-six hours and six days after intubation.—*Chicago Med. Jour. and Examiner.* 1885. Nov, J. E. PILCHER, (U. S. Army).

IV. On the Sequelæ of Tracheotomy in Laryngeal Diphtheria of Childhood. By M. NNEUKOMM (Zurich). Of 203 cases of tracheotomy for diphtheria from 1881 to 1885 in the Zurich surgical clinic eighty-one were dismissed cured. N. hunted up and examined seventy-six of these—sixty-five laryngoscopically—from one to three years after the operation. Entirely normal conditions were found in fifty-eight, although most of these had for some time hoarseness, cough and respiratory troubles, and some also diphtheritic paralysis, especially of the velum. Goitre had occasioned the troubles in many of the other cases; in eight, however, the operation was certainly the cause. In some few cases the cicatrix had moved towards the thyroid cartilage resp., in the inferior operation towards the sternum. In four one end of the cricoid cartilage stood out over the other; in one the trachea was slightly twisted by cicatricial retraction. In seven cases a previously existing hypertrophy of the thyroid gland had almost disappeared, although it is of course doubtful if this resulted from the operation. Examination of the thoracic organs showed little worth mentioning—sometimes slight pulmonary emphysema. In eight cases there was some vocal disturbance—long continued hoarse-

ness, or cough, caused by tracheobronchial catarrh, or loss of power in the otherwise clear voice; a few showed insufficiency of the vocal cords, and three became short of breath on over-exertion. Of the five not seen two had died—one from laryngeal stenosis and the other possibly from a granulation stenosis, since it had suffered from nocturnal respiratory troubles with stridor, and died suddenly at the table. Kramer, of Göttingen, in reviewing this article, corroborates the rarity of respiratory, phonic, or other troubles following tracheotomy in childhood.—Abstract in *Centbl. f. Chirg.*, 1885, No. 38.

V. Hare-Lips in the Heidelberg Clinic, 1877-1883, with Special Reference to Mortality Statistics, and a Contribution to Odontology. By Dr. F. GOTTHELF. Although the methods of operating this trouble have been well perfected and give fine results, yet there are many questions connected with the subject not yet decided—the morphological significance of the intermaxillary bone, mortality from the operation, influence of age on the same, etc.

CHAPTER I.—*General Statistics.* This includes cleft palate, since both forms have the same embryological origin. There were fifty-six cases in the time stated, ten of which were cleft palate. The males (35) outnumbered the females (21), and were also severer cases, thus bearing out what was first noticed by Bryant and corroborated by Fritzsche. As usual, those on the left side outnumbered those on the right. Their etiology is as yet obscure. Heredity plays but a minor part (three out of fifty-six cases, once in a brother, twice in a maternal uncle). He adds a recent case, where the mother had been operated for hare lip, making four in fifty-seven, or 7%. In two other cases there was asymmetry of the nose, and in one abnormal position of the teeth in the parents. Four cases were said to have been "marked" by the mother ("Versehen"). G. has collected 176 cases, with eighteen, or 10%, where heredity was a factor.

In one of G.'s cases there was a labial fissure reaching to the nostril on the left, while on the right the lip was just indentated, with a fine linear scar running to the nostril—of intrauterine origin. In another case each index finger had but one basal phalanx, and the third and fourth fingers on both sides were partly grown together.

CHAP. II.—*Odontology*. This has reference chiefly to the theory of a double incisor bone on each side, so fully worked out of late by Albrecht (v. ANNALS, for June, 1885, p. 578), and corroborated by Turner. G. finds that his cases harmonize better with this theory than with any other.

CHAP. III.—*Mortality Statistics of Hare Lips*. Of the forty operated cases from which some report was obtained up to February, 1884, twenty had died, though all had been dismissed cured.¹ On comparing with the death rates in Baden and Prussia these (all legitimate) show a death rate about 20% higher than the average of like situated legitimate children, and about 10% higher than the illegitimate. Of course his cases are too few for definite conclusions. By adding his cases to Fritsche's—a total of ninety-six, though not all operated—he finds that the mortality increases with the severer forms; those involving the palate and bilateral show a mortality of 66.6% (twelve out of eighteen). The mortality in the latter case is probably in part owing to the severe operation of retracting the intermaxillary prominence.

Of G.'s cases six died in the second week, four between second week and end of third month, and ten later. Various children's diseases are given as cause.

The mortality in the first fourteen days after operating, in 337 cases which he has been able to collect from various sources, amounted to 10.6%. This, however, is too low, since their stay in a hospital averages but little over a week. In 151 cases, however, inquiry had been made concerning the two weeks, and of these eighteen, or 12% had died. Of 134 other reported cases eighteen, or 13.4%, had died from the third week to the third month, inclusive. The total mortality amongst these 134 amounted for the first three months to 23.4%. Of 121 cases operated by Billroth, Rose and Czerny 41, or 34.1%, died within a year. Of course the cause of death in these cases cannot be entirely attributed to the operation, and mortality statistics of not operated hare-lips are wanting.

The dependence of mortality on the age chosen for operating is

¹ The fact that no death followed from the operation is believed to be partly due to a rule of Czerny's, that the mother be admitted with the child to take care of it.

next considered. Of 113 under 1 year forty, or 35%, died during the year, while the average mortality for the same age in Baden and Prussia is 24%.

By comparing tables and curves he concludes that: 1. The mortality of operated hare-lips in the first year of life is in general less dependent on the injurious effects of the malformation itself than on the operation. 2. The injurious effect of the operation is most evidently and immediately noticeable in the first three months of life. 3. The after effect of the operation is less noticeable after the third month—in fact is slight, unless, possibly, after the ninth month (dentition). However, those operated in the first three months do not show a higher mortality in the first two weeks post operat., but rather a permanent weakening, which eventually leads to the less favorable result.

After citing various authorities he concludes that weakly and sickly children ought not to be operated the first year, but that the fourth, fifth and sixth months—just before dentition—are the most favorable. That, however, better chances quoad vitam are secured by an operation the first year, he does not find to be the fact; it is necessary to individualize. For complicated double cleft it is advisable to wait until after the first or second year.

Next comes the mortality from the various operative procedures. Operative retraction of the prominent intermaxilla is frequently attended with considerable hæmorrhage and has a high mortality if done the first year.

The eight cases operated by Czerny (in the first six months) with negative results, all died within eight months. G. thinks that both imperfect wound union and death result from a common cause—a weak infantile organism. It is not so much the anatomical conditions as the weakness and tender age of the patients that affect the result unfavorably.

CHAP. IV.—*Methods of Operating and After-treatment.* Chloroform was only used once. The methods employed are described and in part illustrated.

CHAP. V.—*Results.* Primary union followed in about half of Czerny's cases of hare-lip.

In an added note G. refers to Herrmann's similar statistics (*Disser-*

tation. Breslau. 1884) of 135 cases. In the *Centbl. f. Chirg.*, 1885. No. 42, p. 727, a brief 'crib' of Abel's statistics (*Dissert.* Göttingen. 1885) is given, covering later reports from 90 out of a total of 116 operated cases. These various collections agree very well, and hence we do not need to again go over the figures.

G.'s articles include various tables and close with a tabular review of his own cases.—*Arch. f. klin. Chirg.* 1885. Bd. 32, Hft. II and III.

CHEST AND ABDOMEN.

I. Case of Right-Sided Chylothorax from Rupture of the Thoracic Duct. By Dr. KRABEL (Witten.). K. adds another case to those collected by Kirchner (v. ANNALS, September, 1885, p. 263). A miner, æt. 16 years, was run over in the pit by an empty coal car of 300 kg. weight. When seen next morning he did not appear to be severely injured. No trouble in breathing; only complained of pain in sternum and to sides of chest. Spine somewhat sensitive to pressure over last dorsal vertebra, yet not more so than on sides of body. He could sit up alone. No paralysis, cough nor expectoration of blood. Below right scapula a dulness reaching up two finger breadths. He was comfortable at this time. Next day some increase in dulness. The third day he was worse. Breathing more rapid, no fever. Preference for lying on right side. He got up against orders and walked across room. In night from 4th to 5th he became suddenly worse, dyspnœa; restlessness, thirst without fever. Morning of 5th, dulness over whole right side of chest, except tympanitic at apex front and back. P. 110. He was not punctured since a right hæmo-pneumothorax from vascular injury was assumed. Death same afternoon from suffocation. Right pleural cavity filled by about 6 l. of a milky, odorless fluid. Lung collapsed and uninjured. Transverse fracture of ninth vertebra, and opposite this a transverse rupture of thoracic duct. The chyle is believed to have developed a gas, as in a very similar case of Quincke's. Aspiration he thinks would have been futile.—*Centbl. f. Chirg.* 1885. No. 42. P. 736.

W. BROWNING (Brooklyn).

II. On Thoraco-centesis for Empyema. By Dr. PAUL BLUMBERG (Baku). At present thoracocentesis is used only for the re-

lief of serous pleuritic effusions, to prevent access of air; and free incision, permitting air to enter, is in use for empyema. The author calls attention to the disadvantages of the latter operation: (1.) The patient is subjected to offensive wettings with pus and blood, and therefore exposed to colds and skin-eruptions; (2) The possibility of occasioning hæmorrhage by wounding the intercostal artery is a source of anxiety to the surgeon; (3) The operation is of longer duration and of greater painfulness than is necessary.

On the other hand, however, paracentesis without admitting the air is not advisable (1) because it would have to be daily repeated, (2) because all the pus could not be completely evacuated and (3) because the pus must have continual escape to avoid putrefactive stagnation. The author therefore recommends the use of a silver canula $1\frac{1}{8}$ inch in length and of $\frac{1}{16}$ inch calibre, large enough to admit a double current catheter, and furnished with a plate resembling a tracheotomy canula; this is to be introduced with the help of a suitable stylet into the sixth intercostal space and left to remain for three weeks. the cavity being washed out daily with a 2 per cent carbolic solution. A rubber tube is attached leading to a basin beside the bed, to carry off the discharge. In fact the author recommends the use of his canula in all cases of effusion; and if they prove serous in character; it may be again extracted. He gives two cases.—*Deutsch. Zeitschr. f. Chirurg.* Bd. 12. Hft. 5 and 6. October 6, 1885.

W. W. VAN ARSDALE (New York).

III. Laparotomy for Acute Intestinal Obstruction: Failure to Discover Cause of Obstruction; Post-mortem Reveals Hernia of Colon through Diaphragm. Reported by Dr. GIUSEPPE GLASSI (Florence). A married woman, aet. 28, mother of two children. First labor had been very difficult. Present condition robust. Was admitted into St. John's Hospital, Florence, on the third day after having been seized with persistent nausea and severe abdominal pain. Patient was apathetic, with good pulse and natural respiratory organs? (ED.). No tenderness of the bowels on palpation; great complaint of nausea, with seizures at short intervals of acute colicky pains, with severe tenesmus. Treatment by opiates, with the addition of hot

baths later, was persisted in for three days with no relief. On the fourth day after admission to hospital most serious symptoms of obstruction had developed, including stercoraceous vomiting, suppression of urine, and great restlessness. Copious enemata of olive oil and linseed infusion were given through the day and the succeeding forenoon without effecting any beneficial result. Collapse being imminent, stimulants were given and laparotomy done, the operation being performed by Dr. Ferrari. The small intestines having been turned out from the abdominal cavity, a careful examination of their whole length and of the cæcum, sigmoid flexure and rectum was made without the discovery of any obstruction. Further search was not deemed advisable, and the conclusion that a mistake in diagnosis had been made was adopted.

The abdominal wound was closed; the woman rallied well, and during the night had no return of vomiting, and had three evacuations. At dawn a sudden collapse manifested itself, with speedy death. The *post-mortem* examination revealed no obstruction in the portions of intestine that had been examined, but the splenic angle of the colon was found to be engaged in a hole in the diaphragm. On opening the chest, so as to avoid any injury to the diaphragm, it was found that a coil of the intestine filled up, in a great measure, the right cavity of the pleura. The heart was displaced to the right in such a manner that its apex was resting behind the lower border of the sternum. The displacement of its base, on the other hand, was slight, the heart presenting a much less oblique appearance than in its normal condition. The left lung was pressed upwards into the cavity of the pleura and close against the spinal column. The lower lobe was in a complete state of collapse, while the upper part contained air, and was slightly cedematous. Passing to the examination of the diaphragm, it was observed that the rupture was of an oval form and surrounded by a fibrous ring. Its position was in the anterior half of the left of the muscle corresponding with the normal seat of the cardiac point. The hernia was placed in such a manner that the part of the transverse colon that had passed into the thorax was situated in front of the descending colon, and this latter was pressed hard against the posterior part of the ring. In the pleural cavity the gut was much distended with gas and the apex of the hernia touched the region under the clavicle.

There was no sac of any kind, so that the intestine was in direct contact with the pericardium and the lungs. In the space near the diaphragmatic ring it was noticed that the constriction of the bowels was such as to hardly admit the tip of the index finger. The walls were somewhat tapered off, and the mucous surface appeared to be superficially ulcerated. The stomach was empty and contracted, and was slightly pushed out of its position toward the right side. The spleen also was pressed to the right side. Upon trying to reduce the hernia the ascending gut slipped back into the abdominal cavity without offering any resistance, while the posterior descending colon could also be reduced, but with some difficulty in consequence of its adhesion to the rim of the ring. Upon reducing the hernia it was distinctly seen that the intestine was abnormally prolonged. This fact, together with the condition of the ring, showed the hernia to have been of long standing.—*Lo Sperimentale*, 1885, March.

PIETRO MICHELLI (London).

H. P. DUNN (London).

IV. A Successful Case of Cholecystotomy, with Critical Remarks. By A. C. BERNAYS, M.D., (St. Louis, Mo.). A woman, æt. 46, suffered greatly from colic and presented a tumor in the right hypochondriac region which had been observed to be continuously enlarging for the previous two months. The diagnosis being uncertain, an exploratory laparotomy was made in the linea alba, exposing a greatly enlarged gall bladder, which was drawn out of the wound and emptied of about a pint of perfectly clear mucus, with a slight greenish deposit in the last ounce or two only. The cystic duct was found to be plugged by a large gall stone, which was removed together with about twenty others found in the sac. The gall bladder was then closed, the edges of the incision being first drawn together by seven sutures of fine, iron-dyed silk, cut close to the knot; the peritoneal walls on either side of the incision were then drawn and sutured after the manner of Lembert, the viscus cleansed and returned to the abdominal cavity. All operative procedures having been performed after the gall bladder had been drawn out of the abdominal cavity, the "toilet" was deemed unnecessary. No antiseptics were

used, but scrupulous cleanliness maintained throughout. Aside from the vomiting of a very large quantity of bile during the evening and night after the operation, recovery was uninterrupted, and the patient left her bed on the twenty-first day. As a result of his studies in connection with this case, the author concludes that:

1. The causes which indicate operative interference with the system of gall vessels are: *a*, jaundice, *b*, paroxysmal pain or a tumor in the right hypochondriac region; *c*, suppuration; *d*, peritonitis; these conditions are to be either severally or singly recognizable, the presumable origin being biliary calculi; *e*, malignant disease.

2. Explorative laparotomy must be preferred to acupuncture or aspiration as a diagnostic measure.

3. The incision in the linea alba is preferable when there is much doubt regarding the seat of obstruction, because the large ducts can be reached much better from this incision than from the incision parallel to the free border of the ribs.

4. The escape of bile through an abdominal fistula is not injurious to the process of normal digestion. The bile is an excretion, and probably of no more use in the intestinal canal than the urine in the bladder.

5. Jaundice, when caused by an obstruction of the common duct, is no contraindication to natural cholecystotomy. We may often save life by its early performance.

6. Cholecystotomy, natural and ideal, and cholecystectomy are the three operations at our service; cholecystenterostomy may be useful, but it has not yet earned a place among approved surgical procedures.

7. "Ideal" cholecystotomy, performed by the author, is indicated when the bladder is normal in structure and when the gall-ducts have been cleared of obstructing calculi.

8. Natural cholecystotomy with the formation of an abdominal fistula, is indicated when the bladder is ulcerated or suppurating, or when there are permanent obstructions beyond reach at the time of operation.

9. Cholecystectomy should be limited to cases of otherwise incurable or malignant disease of the gall-bladder.—*St. Louis Weekly Med. Review*. 1885. Oct. 14.

V. Case of Cholecystotomy. By W. W. KEEN, M.D., (Philadelphia). Man, æt. 45, subject to colic, with a tumor in the right hypochondriac region from which an aspirator drew bile, and a probe passed through the needle at the same time was thought to have detected a gall-stone. The abdomen having been washed with carbolized water, an incision three inches long was made parallel with the rib, over the tumor, which was found to be an enlarged left lobe of the liver. The gall-bladder was found to be displaced, the duodenum being mistaken for it and opened, then closed with silk sutures; it was finally found, much shrunken and closely contracted about two large gall stones, far posterior to its proper site. The calculi were removed, the gall-bladder sutured with carbolized silk Lembert's sutures, the abdominal cavity washed with carbolized water, closed with wire sutures and the wound dressed with mercuric bichloride gauze. The patient died fifteen hours later from shock and a small amount of after-hæmorrhage, presumably from vessels injured in lifting the mass in which the gall stones were situated.—*Phila. Med. Times.* 1885. Nov. 14.

VI. Cases of Abdominal Injury. By J. A. STUCKY, M.D., (Lexington, Ky.). **CASE 1.** Man, æt. 33, received dirk wound extending from the anterior superior spinous process of the ilium to just over the symphysis pubis, through which six or seven feet of small intestine protruded and lay on a sawdust covered floor. The intestines were carefully washed with a carbolized solution and three wounds were discovered from which fæcal matter was escaping, and sutured with catgut. The abdominal cavity was also washed with a carbolized solution and, the gaseous distension of the bowels rendering their return into the abdominal cavity impossible, the gas was made to escape through a number of minute punctures made with the point of a scalpel. The wound was closed with uninterrupted silk suture and adhesive straps. The antiseptic dressings applied consisted of cloths wet with Listerine and applied every four hours. Recovery was uninterrupted and complete in four weeks, leaving a small ventral hernia.

CASE 2. Man, æt. 28, had the coupling link of a freight car, $5\frac{1}{2}$ inches wide and 18 inches long, forced completely through his abdomen to the left of the median line, just below the last rib. The end

of the link being rounded, none of the viscera were injured. The wound was washed with carbolized water and the edges brought together by deep silk sutures reinforced with adhesive plaster strips. Circumscribed peritonitis, sloughing of the wounds and free suppuration complicated the recovery, but the patient was able to sit up in bed on the eighteenth day and return to his work after three months cured, but with a large ventral hernia kept in place by a pad and bandage.—*N. Y. Med. Record.* 1885. Nov. 21.

VII. Intestinal Obstruction: Acute Peritonitis: Ovariectomy: Laparotomy with Recovery. By J. W. LILLY, M.D., (Pomeroy, O.). A woman, æt. 34, had presented the symptoms of intestinal obstruction for five days, and laparotomy was decided upon as a last resort, the patient being already in a state of collapse. The abdomen being washed with a carbolized solution, the abdomen was opened in the middle line; the peritoneum was found to be subject to general inflammation, and an ovarian tumor between six and seven inches in diameter, was discovered, bound down by firm adhesions, one of the bands of adhesion being the cause of the obstruction. The attachments were torn loose, the tumor removed, the toilet of the abdomen performed, the external opening closed and an antiseptic dressing applied. The patient's recovery was complete in spite of an intercurrent attack of capillary bronchitis.—*N. Y. Med. Record.* 1885. Nov. 14.

VIII. Case of Laparotomy for Gunshot Wound of the Small Intestine and Mesentery. By D. A. V. PARK, M.D., (Chicago, Ill.). The patient, a slight boy æt. 16 years, had suffered a pistol-shot wound twenty-two hours previously and in the mean time had been under unfavorable surroundings. The incision was made four inches long, two inches to the left and parallel with the linea alba, directly over the wound; on incising the peritoneum, a large quantity of blood and clots was found obscuring two intestinal wounds; one where the peritoneal and muscular coats only were carried away, and the other opening directly into the intestinal cavity, cutting off a small mesenteric artery, which was tied and the intestinal wounds closed with interrupted sutures. The toilet of the abdominal cavity was performed with care and the external wound closed. From this time the patient sank

steadily and died seventeen hours later. Autopsy revealed commencing peritonitis and repair. The author expresses a belief that had the surgical interference occurred within a short time after the accident recovery would have ensued.—*Med. Jour. and Examiner.* 1885. Nov.

GENITO-URINARY.

I. Gangrene of the Scrotum Following Excision of Inguinal Glands. By W. B. PLATT, F.R.C.S. (Baltimore). A report of three cases of removal of inguinal glands, followed by gangrene of a portion of the scrotum, which the author considers to be a consequence of the operations. In seeking for the immediate cause he repudiates phlegmonous erysipelas, direct extension of septic infection or inflammation and obstruction of the circulation, and, reasoning by exclusion and analogy to similar conditions produced in other parts of the body, he concludes that it is an acute reflex trophic lesion due to irritation of the branches of the ilioinguinal nerve and reflected to the terminal filaments in the scrotal tissues.—*Med. News*, 1885. Nov. 14.

II. Calculous Disorders and Lithotomy in South China. By F. CARROW, M.D., (Wilmington, Del.). Attributes the prevalence of calculous disease in South China to the alkaline water acting as a disturber of digestion and producing an excess of lithic or uric acid. Poor food and malarial climate are also factors in producing the same result. Out of 138 operations, under poor hygienic surroundings, there were but eight deaths, attributable to the fact that the Oriental tolerates surgical operations better than the Anglo-Saxon. His method of operating is to make a small incision through into the bladder, and then, passing a finger into the cavity along director, to dilate the opening with the finger, believing that better union is obtained in this way than by making an incision of sufficient size for the passage of the stone at once.—*Med. News.* 1885. Nov. 7.

J. E. PILCHER (U. S. Army).

III. Supra-pubic Cystotomy. By F. SWINFORD EDWARDS, F.R.C.S., (London). A patient, æt. 68, was admitted into St. Peter's

Hospital, with chronic cystitis, due to enlarged prostate. He was unable to pass any water without the aid of a catheter. Although the bladder was washed out daily, the call to micturate became more frequent, and instrumentation of the urethra was often attended with much pain and difficulty. As the patient was daily getting weaker, the author asks what means were open to him for the relief of symptoms and for the prolongation of life. 1. Retention of a catheter. This had been tried in vain. 2. Supra-pubic puncture was inadmissible, as the bladder was contracted and did not allow of distension. 3. Perineal cystotomy did not seem expedient, looking to the worn-out condition of the patient and to the probability of nephritis co-existing. 4. External urethrotomy would not have been of much avail, as the obstruction to micturition would still have prevented the escape of urine. 5. Puncture through the prostate, as advocated by Harrison in cases of enlarged prostate and distended bladder, was out of the question, as the bladder, in this case, was contracted. 6. Supra-pubic cystotomy was now the only course left open.

This was accordingly done, the bladder wall being incised close behind the pubes on the point of a silver catheter. Immediate relief to symptoms followed the operation, and the patient has since continued to wear an India-rubber tube in the hypogastrium, through which he daily washes out the bladder. Two years after the operation the patient was still wearing the tube.—*Med. Times*. 1885. May 30.

IV. The Treatment of Urethral Stricture. By F. SWINFORD EDWARDS, F.R.C.S. For purposes of treatment the author divides strictures into two great classes. 1. Strictures of the meatus and penile urethra. 2. Strictures of the fixed or bulbo-membranous urethra.

For the first variety dilating urethrotomy by means of Otis' instrument is recommended, and for the second, where treatment by bougie is not effectual, internal urethrotomy, by means of Tevan's modification of Maissonneuve's urethrotome. Mr. Edwards has operated with this instrument in thirty cases, with invariable success. In 142 cases of internal urethrotomy, involving the deep urethra, during the last three years at St. Peter's Hospital, for stone there were three deaths only.

One was due to shock, another to hæmorrhage, and the third to suppression of urine in a case complicated with suppurative nephritis.

Rules are laid down for the treatment of urethral fever and urinary suppression.—*Lancet*. 1885. Feb. 21.

V. Supra-pubic Lithotomy. By M. TERRILLON (Paris).

A stone having been crushed in the vesical bas-fond, the rest of the bladder was explored, with the effect of discovering a hard body situated in the upper part of the organ. An incision was therefore made into the bladder above the pubes and five calculi were found embedded in a sacculæ. These were removed and the patient rapidly convalesced.—*Le Progrès Médical*. 1885. June 20.

VI. Latent Vesical Calculus. By E. HARRY FENWICK,

F.R.C.S., (London). Stone in the bladder may give rise to no symptoms, owing to (1) anæsthesia of the vesical mucous membrane. See a case in Deschamp's *Traité de la Taille*, vol. 1, p. 166; or (2) mechanical causes preventing the stone from falling into the neck of the bladder. These mechanical conditions are of three kinds: 1. Adherence of calculus to bladder wall. 2. Sacculætion of bladder. 3. Pouching of the bas-fond of the bladder. Attention was drawn particularly to the last cause, which was usually attributed to an enlarged prostate, but which is really produced by stricture of the urethra. It consists of an hypertrophy of the muscles of the ureters, known as the muscles of Ellis, which cross the base of the the trigone from ureter to ureter. This ridge, behind which the bladder is pouched, may prevent a stone falling into the neck of the bladder just as may an enlarged third prostatic lobe.—*Brit. Med. Jour.* 1885. May 23.

VII. Saccular Dilatation of the Urethra. By LAWSON

TAIT, F.R.C.S., (Birmingham). Four cases of this occurring in the female are recorded from the author's own practice. The symptoms in all cases were similar, the patients being constantly troubled with an escape of fetid ammoniacal urine, causing irritation and discomfort. The escape did not occur during micturition, i. e., the urine passed voluntarily and was usually perfectly clear and sweet, but either with the least strain of micturition or pressure, or on a sud-

den change of position, and at other times inexplicably, this foetid urine escaped without the cognizance of the patient until she found herself wet and uncomfortable.

On examination a tumor apparently continuous with the neck of the bladder, presented itself between the nymphæ, resembling an ordinary cystic vaginocoele, save that it was tender on pressure. On pressing it the characteristic foetid and purulent urine escaped by the meatus.

When a catheter was passed into the bladder with the point well directed to the urethral roof, it passed easily and healthy urine was drawn off. When, on the contrary, the point of the instrument was passed with slight pressure along the floor, it entered the cavity of the tumor and putrid urine escaped.

Treatment—A catheter being in the urethra an elliptical piece of the tumor was excised, laying open the cavity. The thick mucous lining dissected off as far as an aperture leading into urethra and finally the vaginal mucous membrane closed over the cavity by deep silver sutures. Catheter retained for five or six days. Stitches removed on the eighth or ninth. All the cases did well.

M. Gillette of Paris records a similar case, though whether it was exactly like Mr. Lawson Tait's does not appear quite certain.

The author attributes this condition to an error in development by which a small offshoot of the urethra like a diverticulum of intestine is the result of faulty union of the primal folds and that this becomes of pathological importance owing to errors of urination to which the sex is more or less addicted.—*Brit. Med. Journ.* May 16.

F. SWINFORD EDWARDS (London).

WOUNDS, INJURIES, ACCIDENTS.

I. The Results of Dressing Wounds with Sugar and the Methods of Wound-Treatment as Used at the Surgical Clinic at Strassburg. By Dr. F. FISCHER (Strassburg). Sugar was introduced as a surgical dressing in the Strassburg surgical clinic by Prof. Lücke in May, 1883. One year and a half having elapsed since that time the author believes a sufficient test to have been exercised upon the method, and publishes the results, giving thirty-one pages of condensed reports of cases, including eight com-

pound fractures, thirty-five cases of amputation and twenty resections, and a number of statistical tables.

The use of sugar has the advantage of enabling the surgeon to do away with all contact of poisonous substances with the wounds; the dressings used being sufficient to prevent any infection of the wound from without and to keep it aseptic and prevent the secretions from becoming putrid, provided the wound was not infected during the operation.

Sugar itself has antiseptic properties, as was known to Galen, Scultetus, Pringle and others. The mode of applying it is as follows: Muslin rendered absorbent by boiling in alkaline solutions is laid once folded upon a table; the sugar is then poured upon it and spread out so as to form a layer one-half centimetre in thickness and extensive enough to overlap the wound to be covered at least two centimetres in each direction, and the muslin simply folded over it. These cushions suffice for wounds with slight secretion, but when copious discharge is present wood-wool is used over the sugar-bag.

The wounds themselves are first disinfected by a one in thousand sublimate solution, the use of which never caused any alarming symptoms in children, although in adults two cases of hæmorrhagic diarrhoea, several of stomatitis and one case of hæmorrhagic nephritis is reported, which led to the subsequent substitution of hypermanganate of potass for disinfecting all cavities, or when nephritic trouble was present. An action of the sublimate on the urine was, however, very frequently observed, coloring it red, with a slight fluorescent turbidity, for a period of three days in adults. Twice erysipelas attacked wounds thus disinfected. Open wounds were treated for a time with naphthaline and sugar in equal parts, but later on in preference with iodoform and sugar, one in ten. But sugar alone sprinkled on fresh open wounds was found to be an excellent dressing, and to keep the granulations in a good condition, causing rapid cicatrization. Indeed, it alone suffices to destroy the offensive odor of foul ulcers and broken-down tumors, after repeated application.

As regards the technical aspect of wound-treatment, in Strassburg carbolic acid is used for cleansing the hands, for disinfecting the sponges, for preserving the drainage tubes and the silk sutures. All

ligatures are likewise applied with carbolized silk. The instruments remain immersed in 5 per cent carbolic solution for half an hour before use. Spray is used to cleanse the room before operations and during laparotomies. The sugar-bags being laid on sutured wounds, absorbent muslin is placed over them, and subsequently rubber tissue and cotton, the whole being fixed with wet and dry bandages.

The dressings are changed on the sixth or eighth day, for the purpose of removing the drainage-tubes. But they may remain unchanged as long as two weeks, and in cases of profuse secretion it suffices to add another bag wherever the syrup appears at the edge of the dressings. As a rule, however, the sugar does not dissolve. The course of the wounds was favorable; fever, over 39° C., rarely appeared in the evening; more frequently the temperature rose over 38° C. on the second or third day. The dressings were changed whenever a temperature above 38° C. was registered in the morning.

The cases thus treated were 202 in all, five of which terminated in death, one of erysipelas, one of hæmorrhagic nephritis. Thirty-one of the thirty-five amputations healed by first intention, two died and two were complicated with septic affections. The average duration of the time of healing was twenty-two days, a shorter period than the ones published heretofore.

The author does not advocate the use of sugar-dressings for phlegmonous inflammations, empyema, or extensive suppurations, on account of the liquefaction of the sugar by the discharge, but would recommend them chiefly for sutured wounds, abrasions, and superficial lacerated contusions.—*Deutsch. Zeitschrift. f. Chirg.* Bd. 22. Hft. III. 1885. July 30.

TUMORS.

I. Contributions to the Pathology of Tumors. By Prof. F. WILLIAM ZAHN (Genoa). (Continued from Vol II, No. 10, p. 340, of this journal). 4. *A myxo-sarcoma occurring in a fœtus of six months, and originating from Bichat's boule graisseuse.*—The fœtus had a healthy mother, measured 30 cm. in length and 22.5 cm. around the head, and was highly œdematous. On the left cheek it presented a tumor 15.5 cm. in height, 12.5 cm. in breadth from the ear to the chin and of 16 cm. basal and 23.5 cm. maximal circumference.

The growth reached from the ear to the lower eyelid and to the corner of the mouth, and thence passing over the chin, to within 3 cm. of the right ear, and downwards as far as the hyoid bone. The superficies was uneven, the skin normal at the base, but necrotic on top. The tumor was very vascular. On section three zones could be discovered; the external one was narrow, brownish, necrotic; the middle one wider, reddish, translucent; the inner one white, medullary, highly vasculated.

Microscopic examination revealed the centre portion consisting of small round cells with large nuclei, the protoplasm containing fat-globules; the very numerous vessels were wide, and consisted only of an endothelial tube; no connective tissue. The middle zone showed numerous vessels, and between these a homogeneous structure, containing fewer round and some large spindle-shaped cells, with large oval nuclei and fat globules; the latter cells formed a reticulum and possessed processes which interlaced. The external layer showed very fine interwoven elastic fibrillæ and very few round cells. The tumor was confined by a membrane, and, by a process, invaded the fossa sphenopalatina. It was bounded by the buccinator muscle on the inside and externally by the masseter, and closely approached the large vessels of the neck. On the lower portion the confining membrane was missing, and the tumor showed a gradual transition into the normal surrounding tissues. In the upper part several cystic cavities were found, filled with fluid, and containing giant cells (ectasied lymphducts?).

The diagnosis of myxo-sarcoma cysticum at the location of Bichat's "*boule graissusee*," or Ranke's "*sangpolster*," was made—a point where lipomata have been observed, but heretofore no malignant tumors.

5. *On cysts containing ciliated epithelia in the cavum pharyngonasale.*—In this cavity tumors are rare; adenoid vegetations and fibrous polypi are most frequent; next in frequency fibro-mucous polypi and papillomata are observed; and the least frequent growths are carcinomata, sarcomata, and enchondromata. No mention is made of cysts, in the text-books; but three cases have been published by Tröltzsch, Czermak and Luschka, respectively. The author publishes three new cases. The sac consisted of connective tissue con-

taining few cells, and was lined with flat, cuboid or cylindrical ciliated epithelial cells. Externally the sac was encompassed by adenoid tissue without glands, and outside of this was fibrillar connective tissue containing glands. These cysts were situated in the pharynx close to the os basillare, between the apertures of the Eustachian tubes. They are thought by Luschka to originate from Mayer's pharyngeal pouch.

6. *Four cases of branchial cyst.*—After giving a survey of the literature of the subject, the author describes four new cases. Three of the cysts occurred in the aural region, between the angle of the maxilla and the median edge of the sterno-cleido-mastoid muscle; and one in the supra-clavicular fosse at the edge of the same muscle. The latter developed rapidly, the former ones slowly. In three of the cases the operation was rendered difficult on account of the close connection with the underlying nerves and vessels. Three of the cysts were unilocular, one multilocular. Three contained atheromatous matter, only one a fluid. The sac was uneven, papillomatous on the inner surface; the lining consisted of pavement-epithelia in three, and of cylinder-celled epithelia in one of the cases. The sac consisted of fibrillar and lymphatic connective tissue. In one case large spindle- and star-shaped cells formed the external layer.

The author next compares together all the seventeen accurately described cases and deduces the following results: Branchial cysts occur more frequently in children. Eleven cases were congenital, seven occurred during puberty, three between 39 and 55 years.

Their growth is generally slow, painless. As to sex the proportions are about equal. They occur most frequently on the left side (10:3), near the ear. Fifteen cases were unilocular. The contents, with one exception, was atheromatous. The lining is always epithelial, two cases each of cylinder and ciliated epithelia are recorded.

The sac consists of fibrillar and adenoid tissue; one case of combined connective and cartilage-tissue is known. In six cases lymph-follicles were present in the adenoid tissue. The author adds several further interesting details, and traces the origin of these cysts to the persistence of the branchial or visceral clefts.—*Deutsch. Zeitsch. für Chirurg.* Bd. 22. Hft. 3 and 4. 30th July, 1885.

BONES, JOINTS, ORTHOPÆDIC.

I. Some Remarks Upon Seventeen Cases of Fracture of Spinal Vertebrae. BY E. DE REYNIER (Neuchâtel). This paper, written under the auspices of Professor Kocher, of Berne, contains detailed accounts of seventeen cases of fracture of portions of the spinal column, which came under observation during a period of nineteen years (ending 1884), in the surgical clinic of Berne. The fractures occurred in the dorsal region nine times, and four times each in the cervical and lumbar regions. Eleven of the cases died, two recovered, and four showed slight improvement. Fifteen of the patients were males, two females, all laborers. The cervical fractures all occurred between the sixth cervical and first dorsal vertebrae, and pertained to the body, the arch and the spinous process of the vertebrae; those lower down only affected the bodies of the vertebrae, and were generally situated between the tenth dorsal and second lumbar vertebrae. The spinal marrow was injured in various ways. Six of the fractures are classed as indirect, the patient falling on his head in five cases, and five as direct ones. All the cases of cervical fracture died; one of high temperature, one of coma, one of convulsions occurring after use of the catheter, and one of asphyxia. Of the nine dorsal fractures five cases died from suppuration, one recovered with urinary disorders, the rest remained in *statu eodem*. Two of the cases of lumbar fracture died from the effects of suppuration (pyæmia), one recovered. No cases died from myelitis. In all the fatal cases, in which respiration continued unembarrassed, death ensued from infection from without (cystitis, decubitus):—life is dependent upon the prevention of infection. The lower down the fracture is situated the more hope there is for the maintenance of life.

The author does not dwell upon the well-known symptoms of vertebral fractures, as kyphosis, the state of the reflexes, the action of electricity, coma, priapism, etc., but turns his attention to some special symptoms which, in his cases, did not accord with the generally accepted theories.

In cervical fractures the temperature reached 43.2° C. in one, and 41.4° in another case; in one case it sank to 33.6° C. The pulse was

quiet, regular and infrequent, contrary to Charcot's and Erb's assertion, even when the temperature was high. In the dorsal and lumbar fractures fever is, however, an exception (contra: Erb).

The vasomotor disturbance varies; the paralyzed parts are warmer than the others as long as no fever is present; when the temperature rises the paralyzed parts are at first colder than the rest, and follow them very gradually. Decubitus occurred very soon after the injury, and was dependent upon the loss of sensibility. It could be prevented by the use of water or air-cushions. The myelitis accompanying motor paralysis never ascended more than 1 or 2 centimetres. After complete motor paralysis only one case of recovery could be recorded (*vide infra*); the other cases remained unimproved. Convulsions occurred in two cases. Vomiting occurred only from the second to the fourth day after injury. Constipation was always observed, generally lasting from two to five days. Tympanites was always observed in the cases of cervical fracture. The fæces were formed in the cases of dorsal and lumbar fracture, and diarrhoea only occurred after decubitus or cystitis had set in.

The author accounts for the retention of fæces after lesions of the cervical marrow by assuming that the intestines are paralyzed; if the lesion is situated further down only the lower part of the intestine is paralyzed; and if the centres of defecation are uninjured, the passages are regular, the distension of the rectum acting as stimulus, but without being influenced by volition. Incontinence is only effected by paralysis of the sphincter muscle, in which case alvine discharge may be (but need not be) continuous. As for the urinary disorders, the quantity of urine passed in injuries of the spinal marrow is normal (contra: Erb); it is always acid at first, and only once contained sugar and once albumen. In consequence of spinal lesion retention and stagnation of the urine occurs, necessitating the use of the catheter. If the urine becomes alkaline it is either in consequence of some infection introduced by means of the catheter, or by the occurrence of hæmorrhages. The urine turns alkaline after three or ten days' use of the catheter. In four cases, however, cystitis could be avoided.

The author follows Kocher in believing that the bladder is generally occluded by automatic, elastic action. Distension causes a stimulus to

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be conveyed by the bladder nerves to the spinal cord and to the volitional centres of the brain; and then the bladder is emptied. If micturition is to be prevented, the voluntary muscles of the external sphincter vesicæ are contracted. If the tract leading to the brain is destroyed voluntary micturition is rendered impossible. If the reflex centres are impaired (in fractures of the last dorsal and first lumbar vertebræ) the bladder becomes gradually distended, until the elastic tension of the internal sphincter is surmounted, when the urine leaks out drop by drop. In such cases early use of the catheter is advisable. As soon as the elasticity of the tissues becomes impaired (a consequence of cystitis) incontinence ensues.

The pressure in the bladder was also directly measured, and it was found that in cases of distended bladder about 100 cm. of urine remain in the bladder after use of the catheter. As to treatment of vertebral fractures, the author recommends the use of air-cushions as soon as disorders of sensation set in. In using the catheter, which should be preserved in carbolic solution during the day, care should be taken not to cause hæmorrhages.

Reduction of a dislocated vertebra should be attempted while the patient is suspended by his head, and a plaster-of-Paris corset should be at once adjusted and left on for two months. In one such case (fracture of the seventh dorsal vertebra) the author tested this method, and with excellent result: in one week sensation had returned, and in a month the patient was able to walk with crutches, and in two months without them.—*Deutsch. Zeitschr. f. Chirurg.* Vol. 22. Hft. 3 and 4. July 30, 1885.

W. W. VAN ARSDALE (New York).

II. Fracture of Rib Caused by Sneezing. By H. C. WYMAN, M.D. (Detroit, Mich.). Relates a case of a man æt. 72, who fractured his eighth rib during a paroxysm of sneezing. The author attributes the production of the fracture to muscular action.—*Jour. Am. Med. Assn.* 1885. Nov. 7.

III. Fracture of Sternal End of the Clavicle. By H. C. WYMAN, M.D. (Detroit, Mich.). A boy, æt. 16, fell on his head and left shoulder and fractured his clavicle at about one inch from the

sternal end. The sternal fragment had a marked tendency to be displaced upward by the sterno-cleido-mastoid muscle, the sharp points irritating and causing spasm of the platysma myoides. The displacement could not be properly reduced for this reason, and a very large amount of callus was formed, making an unsightly deformity, and interfering with the free movement of the arm. This could have been prevented by immobilizing the head or by sub-cutaneous section of the muscular fibres.—*Med. News.* 1885. Nov. 7.

IV. Treatment of Fractures of the Bones of the Leg and the Patella by Drilling and Wiring the Fragments.

By J. W. WRIGHT, M.D., and L. W. HUBBARD, M.D. (New York). Five cases are related of compound fracture of the tibia and one of both leg bones, and three cases of fracture of the patella. In the former the wounds were cleansed of all debris, all shreds of tissue were removed, the fragments drilled and wired together with silver or silver-plated copper wire, under bichloride irrigation, a drainage-tube inserted, the external wound closed with cat-gut sutures, and antiseptic dressings applied, which were removed for redressing in from eleven to twenty-one days. All the cases made an excellent recovery. In the cases of fracture of the patella, where the widely-separated fragments could not well be brought together, or where the joint was swollen and filled with clots and suppurative inflammation was feared, the joint was opened by a crucial incision, the cavity cleared out, the fragments wired together and the wound closed, all under irrigation; antiseptic dressings were then applied and the limb immobilized. Bony union seemed to be obtained in three cases. The advantages of this method are (1) the facility with which the wound may be cleansed of all matter likely to interfere with healing without suppuration; (2) the possibility of effecting immediately perfect and permanent reduction of the fragments and the avoidance of irritation by them; (3) the avoidance of disturbing the parts by frequent dressings; (4) the greater probability of speedy union where the parts are securely immobilized; and (5) the ability to save certain limbs, the seat of bad forms of compound fractures, which, under any other method of treatment, would demand amputation or greatly endanger life by prolonged suppuration and its sequelæ.—*N. Y. Med. Jour.* 1885. Oct. 31.

V. Cases of Infantile Paralysis Treated by Excising the Useless Joint and Producing Bony Ankylosis. By AP. M. VANCE, M.D. (Louisville, Ky.). Reports three cases of deformity from infantile paralysis, in which the knee-joint was excised in two cases and the ankle-joint in one, with a result of giving the patients a serviceable, though stiff, limb, in place of a useless one.—*N. Y. Med. Jour.* 1885. Nov. 7.

VI. Osteotomy for Deformity. By AP. M. VANCE, M.D. (Louisville, Ky.). Relates two cases, in one of which, as the result of old hip disease, the thigh was ankylosed at an angle of less than 90° with the pelvis. Osteotomy with the chisel was done just below the trochanter, the bone fractured and the limb straightened, healing in immovable dressings with entire relief to the deformity. The other case was a lad of 17, whose knee-joint was ankylosed at an angle of 135° with rotation of the leg and marked genu valgum. The femur was divided just above the condyles, as in the preceding case, and with a like result.—*N. Y. Med. Jour.* 1885. Nov. 7.

GYNÆCOLOGICAL.

Three Cases of Removal of the Ovaries and Fallopian Tubes. By W. W. KEEN, M.D. (Philadelphia). CASE 1. Married woman, æt. 42, exceedingly weak and anæmic, subject to profuse menorrhagia and with an interstitial uterine myoma as large as the fist. Under full Listerian precautions the abdomen was opened, each pedicle transfixed with a double carbolized silk ligature close to the uterus, the upper one including the Fallopian tube, the tubes and ovaries removed, the ligatures cut short, and the wound closed and dressed with carbolized gauze. Recovery uninterrupted, and the patient's restoration to complete health, with no uterine hæmorrhage nor myoma, and with unimpaired sexual appetite.

CASE 2. Married woman, æt. 42, subject to severe nymphomania, leading to incipient insanity, and profuse menorrhagia. As a last resort, removal of the uterine appendages was proposed and performed, as in case 1. The recovery was uninterrupted and complete relief was obtained by the operation.

CASE 3. Single woman, æt. 40, very weak and anæmic, and the sub-

ject of a uterine myoma as large as the fist, with severe and persistent hæmorrhage. The abdomen was opened in the median line and the uterine appendages removed, as in the other cases, but with some difficulty, on account of the enlarged uterus. The patient died three days later from peritonitis.—*Proc. Coll. of Physicians, Phila.* 1885.

J. E. PILCHER, (U. S. Army).

ERRATA.

In the number for December, 1885, p. 482, third line from top, read "extra-vascular pressure of 200 mm. of water" instead of 100. P. 516, sixth line from bottom read "1,000 parts of gauze in 1 part sublimate, 500 parts common salt and 100 to 200 parts glycerine."



ARTERIAL LIGATION AS A PROPHYLACTIC MEASURE AFTER SUDDEN, COMPLETE AND PERMANENT OCCLUSION OF THE CHIEF VEIN AT THE ROOT OF AN EXTREMITY.¹

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THIS subject depends for its interest and importance on these two questions:

1. When the chief vein of an extremity has been suddenly, completely and permanently occluded at its root, are the collateral venous bloodpaths always sufficiently ample to admit such a flow of blood through them that permanent circulatory and nutritive disturbances will not supervene?

2. If, in any appreciable proportion of cases, permanent circulatory and nutritive disturbances are likely to supervene upon such venous occlusion, what prophylactic effect, if any, would be exerted by the diminution of the force and volume of the arterial blood-supply of the limb.

Each of the modifying conditions which have been specified in connection with the occlusion of the vein are of importance. It must be *sudden*, for the tendency of collateral venous branchlets to readily and rapidly enlarge *pari passu* with any encroachment upon a main venous channel is such that if such encroachment is gradual in its progress, by the time it has become complete, a very considerable enlargement of the collateral blood-paths will have been accomplished, with a corresponding diminution of any danger of circulatory embarrassment as a consequence.

In the consideration, therefore, of any clinical observations

¹ Read before the New York Surgical Society, Oct. 27, 1885.

which may seem to have a bearing upon the questions raised, those cases cannot be considered as having much weight, in which a pre-existing tumor has for some time pressed upon or possibly enveloped the vessel previous to its final complete and permanent occlusion.

The occlusion must be *complete* in order to supply the conditions requisite to produce sufficient embarrassment to the return circulation to awaken solicitude as to its ultimate consequences, while upon the *permanence* of the occlusion will depend the importance of an early resort to any measure that may possibly be prophylactic against consequent disability, the permanence of which could alone make their prevention a matter of anxious care.

After this preface, I propose to take up the first question suggested :

Are the collateral venous blood-paths always sufficiently ample to admit such a flow of blood through them, in case the chief vein of the extremity has been suddenly, completely and permanently occluded, that serious permanent circulatory and nutritive disturbances will not supervene ?

As bearing upon the reply to this, I desire to first call attention to certain

ANATOMICAL CONSIDERATIONS.

Sappey, in his *Treatise on Descriptive Anatomy*,¹ states that "copious collateral communications exist between the large vein trunks of the neck and at the root of the upper limb : channels always open, always adequate, and instantly responsive to calls upon them." He also adds : "If one of the great veins at the root of the neck is opened, the surgeon may ligate it without fear of interrupting the current of the blood."

This opinion, however, seems to be based upon a very limited number of experiments. If it was absolutely correct, there would be no occasion to further include the upper extremity in the consideration of the question proposed.

As to the lower extremity also, the statement has been made by Nicaise,² who based his statement, however, on a

¹ Sappey, *Traite d'anat. descript*, 1869, t. ii, p. 694.

² Nicaise, *Des plaies et de la ligature des veines*. Thèse, 1872, p. 113.

single experiment in addition to previous experiments by Sappey, that "after ligation of the femoral vein at the root of the limb, the return circulation is abundantly assured; although at the same time these experiments also show," he says, "that the anastomotic communications between the lower limb and the trunk are less free than those of the upper limb." With this conclusion similar experiments by Richet¹ and Verneuil² coincide. Braune³ (Leipzig), however, has claimed, as the result of anatomical, experimental and literary investigations, that usually the femoral vein has no collateral branches to conduct blood from the lower extremity to the abdominal cavity in case of its occlusion. In his experiments he failed, with an injection pressure of 20 mm. Hg., to drive fluid from the peripheral branches of the femoral vein into the pelvic veins after ligation of the main trunk, in normal young subjects. He was more successful, however, on increasing the pressure.

The more recent and numerous experiments of Braun⁴ (Heidelberg) give more exact and reliable data on this question of the blood-paths collateral to the femoral vein. Forty experiments were made by this observer to test the readiness of the flow of fluids from the peripheral veins of the lower limb into those of the pelvis, after ligation of the femoral at Poupart's ligament. In one the injection passed into the pelvic veins with the greatest readiness, at a scarcely appreciable pressure, equalling at the outside not more than 10 mm. Hg., thus demonstrating already existing collateral passages quite adequate to perform the function of the femoral vein itself. This was readily explained by the fact that there was present in this cadaver, on the side operated upon, a long existing glandular inguinal tumor, the gradually increasing intermittent pressure of which upon the femoral vein had occasioned a dilatation of the collaterals. In seven others a slightly higher pressure, ranging from 10 to 20 mm. Hg., sufficed to drive con-

¹ Richet, *Traité pratique d'anatomie medico-chirurgicale*. 2d edit. Paris. 1860. P. 161.

² Verneuil. *Bull. de la soc. de chirurgie*. 1855-56. T. VI. P. 217.

³ Braune. *Die Oberschenkel Vene des Menschen*. Leipzig, 1871. S. 20.

⁴ Braun. *Die Unterbindung der Schenkelvene am Poupartschen Bande*. *Archiv. f. klin. Chirurg.* 1882. Bd. XXVIII. Hft. 3. P. 610.

siderable fluid into the pelvic veins, the obturator and ischiatic veins being the most common channels, but in some cases the median sacral, the circumflex iliac and the lumbar veins shared in the current.

In eight other instances a pressure of from 50 to 70 mm. was needed. In still other eight, from 70 to 120 mm. were required. In yet another group of eight, the pressure had to be raised to heights ranging from 120 to 150 mm. before success was secured. Of the remaining eight, in two cases a still further increase of the pressure to from 150 to 170 mm. finally caused the injection to penetrate, but in the other six, occurring in four different individuals, absolutely no communication between the femoral vein and the pelvic veins could be established, notwithstanding a pressure of 200, and in some cases 300 mm. Hg. was kept up for an hour.

Review of these results, obtained by Braun, shows that in one-fifth of the total number of experiments an injection pressure not exceeding the normal pressure of the capillary blood-current (20 mm. Hg., von Kries), sufficed to return fluid with considerable freedom into the veins of the trunk, notwithstanding the occlusion of the femoral. In these cases it may be accepted that no circulatory disturbance would have been manifested had sudden occlusion of the vein taken place during life. In the next one-fifth, in which a pressure double and treble the normal capillary was required, it may reasonably be allowed that in the living subject this extra force would have been so far supplied by the natural accessories to the venous current, muscular pressure, aspiration and, possibly, gravity, that any marked or prolonged venous engorgement or capillary embarrassment would have been escaped, as in the first group of cases.

In the third and fourth groups, however, being two-fifths of the whole number, the high pressure required was such as would certainly have entailed marked circulatory disturbances in case of sudden occlusion of the vein during life. In the last group of cases, being likewise one-fifth of the entire number, in the two instances in which any permeability was secured, it was only by a force in excess of the maximum normal arterial pressure in man (150 mm. Hg.), while in the greater number a

very much higher pressure failed absolutely. In these cases there was no possibility of the return of blood from the limb through any pre-existing collateral channels. Gangrene of the limb would have been inevitable, unless in some way the amount of blood pouring into the limb could be diminished, during the gradual opening up of new channels.

A similar careful and sufficiently extended series of experiments upon the axillary and subclavian veins is very desirable to have made. The few experiments which have been above referred to, as made by different French observers, are by no means sufficient in number to warrant any general conclusion.

I pass on, next, to present certain

CLINICAL CONSIDERATIONS.

With regard to the effect upon the circulation and nutrition of the arm which has followed sudden occlusion of the axillary vein high up, or of the subclavian, I have not attempted to compile any statistics, nor do I know of any attempt to collate the results, as far as the after nutrition of the arm is concerned, in any very large number of instances out of the many in which ligature of the axillary vein has been done in the course of operations for extirpating tumors from the axilla. In by far the great majority of such cases it must be that no serious circulatory embarrassment has been experienced, a freedom that would naturally have been expected in view of the usually abundant collateral channels. But that complicating conditions may produce a different result, the following case in my own experience demonstrates, a case which first attracted my attention to the possible results of venous occlusion, and the question of how to obviate them.

CASE I. In January, 1881, in the course of an operation for removal of carcinomatous axillary glands, being a recidive at the end of two years and nine months after the primary removal of the breast, it was necessary to sever the subscapular vein close to its entrance into the axillary. This was done, and the axillary vein itself was then tied by ligatures placed one above and one below the opening in its lateral wall thus made. The patient made a good recovery, and survived the operation for five and a half years. Very shortly, however, after the vein ligature was done, an cedema of the forearm and lower part of

the arm began to develop. This was accompanied with much of aching, aggravated in moist and changeable states of the weather; the functional power of the limb also remained permanently impaired. This condition persisted without amendment during the remaining years of her life, and became much aggravated during the days of general prostration immediately preceding her death.

In this case, in addition to the ligature of the axillary, there was simultaneous ligature of the subscapular branch as well, and also of other branches of less importance that were divided in the course of the process of clearing out the axilla. This must have diminished considerably the number of the collateral channels. But, practically, inasmuch as it is in just such cases that ligature of the main vein is most likely to be also required, this case is fairly illustrative of the conditions that require to be taken into consideration in connection with the occlusion of the main vein at the root of the upper extremity. It is obvious that, whatever may be the adequacy of the provisions for the collateral venous circulation, if simply the main trunk is occluded near its root, the case may be quite otherwise when more or less of the collateral branches have likewise become simultaneously occluded. In further illustration of this I cite the following case:

CASE II. In April, 1885, I had occasion to remove an egg-sized carcinomatous glandular tumor at the root of the neck, in the right subclavian triangle. This was the proximal portion of a recurrent growth which likewise involved the glands of the axilla, and the cicatrix left by the removal of the right breast for carcinoma two and a half years previously. The excision of the cicatrix with the tissue adjacent that was infiltrated, and the cleaning of the axilla were accomplished without accident other than the necessary severing of certain of the lesser veins of the axilla. The growth above the clavicle was next attacked. By the preliminary incisions for uncovering it the external jugular vein and the transversalis colli and suprascapular vessels were divided. The growth was deeply fixed behind the clavicle, and the infiltration of the circumglandular connective tissue was such as to negative easy enucleation. While traction was being made to lift it from its bed, after the outer portion had been freed, a sudden copious venous hæmorrhage occurred from beneath and to the inner side of the growth. While this was controlled by properly directed

pressure, the final removal of the tumor was accomplished. Examination now revealed that a rent had occurred in both the internal jugular and the subclavian veins, the inmost point of the growth having been embraced by these veins as they converge. Ligatures above and below the points torn were applied to each vein. I had now to deal with an occlusion not only of the internal jugular and of the subclavian within an inch of their junction, but also of the external jugular, and the transverse cervical and suprascapular veins, and of numerous smaller axillary branches. It was extremely improbable that the minute collateral communications that existed could enlarge with sufficient rapidity to return any considerable proportion of the blood which was being driven into the extremity through the axillary artery; already the limb was becoming blue and swollen, and the veins which were exposed in the axillary and cervical wounds were turgid with blood, as if under great pressure. The immediate danger was evidently from the continuous forcible distension of the extremity with arterial blood. To meet this supreme indication I at once placed a ligature on the axillary artery in its upper part. The limb was then bandaged with a roller bandage and proper dressings were applied at the seat of operation. The after history of the operation wounds was uneventful. Union by first intention throughout the very extensive wound-tract was secured, except at two points in the neck, where a slight suppuration took place about some of the ligatures.

Twenty-four hours after the operation the patient had experienced no pain in the head or elsewhere. The face was somewhat flushed, especially on the side of the ligated internal jugular. There was no swelling nor lividity of the fingers of the hand of the operated extremity, which was normally warm. The patient said, however, that the hand felt as if its veins were full.

During the second week a considerable œdema of the forearm manifested itself. Bandages and rubbing were employed to dissipate it, but it persisted without much change for about three weeks. It then rapidly diminished, so that, at the end of eight weeks, it had entirely disappeared. Meanwhile the arm had regained much of its functional power, so that the patient was able to perform ordinary domestic work. Since this time her general strength and well being have continued to improve. The arm is well nourished, and, though there is no apparent œdema, it seems somewhat more plump than its fellow. The radial pulse is still imperceptible. There are as yet no signs of recurrence of cancerous disease.

Such a case as this illustrates the statement that the question as to the adequacy of collateral channels when the main

vein at the root of an extremity is suddenly occluded, as it is likely to confront the surgeon, may be a different one from the simple experiment of the anatomist, when the latter isolates and ligates the axillary or subclavian vein alone, and then proceeds to throw in his injection. The two clinical observations which I have just detailed justify the surgeon in the apprehension that permanent circulatory and nutritive disturbances of a serious character may ensue, when, in the course of operations in the axilla or at the root of the neck, in addition to the division of a considerable number of lesser collateral branches, the main vein is also completely occluded. In the second observation it is true that the operator did not delay for the full development of the circulatory and nutritive disturbances which he had reason to apprehend would follow the extensive vein ligatures which had been done, but proceeded at once to employ the only resource in his power for the diminution of the force and quantity of the inflowing stream of blood. Reference to the after-history will show, however, a train of circumstances even more instructive than would have been the occurrence of a general gangrene of the limb from venous strangulation. It is apparent that production of free collateral inlets for the arterial supply was more speedy than the development of the corresponding venous outlets, whence the œdema that showed itself during the second week and its persistence for some weeks, until the slowly enlarging venous channels had become adequate, when it fully and finally disappeared.

With regard to the effect upon the circulation and nutrition of the lower extremity produced by occlusion of the femoral vein at the root of the extremity, the researches of Braun⁷ have placed at our disposal a sufficient number of clinical observations to admit of deductions of practical value.

Of the thirty-seven cases which Braun has collated, there are eighteen in which ligature of the femoral vein alone, at the level of Poupart's ligament, was practiced. Of these, thirteen cases occurred as the result of wounds inflicted in the course of operations for the removal of inguinal tumors.

⁷ H. Braun. Die Unterbindung der Schenkelvene am Poupartschen Bande. *Archiv. f. klin. Chirg.* B. XXVIII. Hft. 3. S. 610.

In none of these tumor-extirpation cases did gangrene ensue. In six of them the circulatory disturbance was either very slight and transient or was absent altogether. In five others, though there was at first considerable cyanosis of the limb, it soon disappeared, leaving the limb entirely normal, or with but a slight œdema.

Two cases are recorded simply as having ended fatally, one by pyæmia, the other by inanition, without statement as to circulatory disturbances. Four deaths occurred among the other cases also from such causes as secondary hæmorrhage, pyæmia and pulmonary œdema.

These results corroborate the statements made in the earlier part of this paper as to the effect upon the development of collateral venous channels exerted by the pressure of a tumor in the groin upon the main trunk. The difference in this respect between an inguinal tumor and an axillary tumor is manifest. In the latter the loose tissues of the axilla and the position of the tumor on a plane below that of the vein favors the considerable development of the growth without subjecting the axillary vein to pressure. Not so in the groin, where the denser tissues, the force of gravity and the alternating states of tension and relaxation occurring in the flexion and extension of the thigh will very early cause a tumor to interfere with the free passage of blood through the underlying vein.

Five cases remain in which, as the result of acute injuries, high ligation of the femoral vein alone was done.¹

The difference between the results precipitated in these acute cases, and those in which pre-existing inguinal tumors had been present, is remarkable. In one only of the five was there recovery without disturbance. One died from septicæmia three days after the ligation, but without the appearance

¹I include in this class one case (that of Busch, 1870—being No. 32 of Braun's collection) in which the external iliac artery had been ligated forty days previously, and in which, after that period of time, in the attempt to control a secondary hæmorrhage, the femoral vein was wounded and tied. The reason for this is that so long a time had elapsed since the primary arterial ligation, that a sufficient arterial collateral circulation had been established to restore the condition of the arterial supply of the limb to nearly its original fullness. The conditions were thus entirely different from those which would have been present had simultaneous ligation of the vessels been done originally.

of gangrene—whether any less profound circulatory disturbance took place or not is not recorded; in one the limb became œdematous, with death by pyæmia; in the remaining two fatal gangrene rapidly supervened.

In addition to these cases I will here place on record a new observation, communicated to me by Dr. Wm. Browning, of Brooklyn, since it is closely allied to this class of acute cases.

CASE III. In 1881, in the course of an operation for the extirpation of a suppurating bubo in a young man of about 22 years of age, the internal saphenous vein was wounded, and for the control of the hæmorrhage a ligature was placed upon it close to the main femoral trunk. The patient recovered without special untoward symptom until he began to be up, when an œdema of the leg developed, which, after long continuance in the upright position, would become so great as to distend the whole limb up to the hip. During the night the swelling would largely disappear. At the expiration of about six months, when last seen, the tendency to œdema was still so great that he was unfitted for any work, and he begged for the removal of the limb.

Whatever the character of the obstruction to the venous return may have been in this case, it was sufficient to positively demonstrate the insufficiency of the collateral channels at the root of the limb.

The considerations, anatomical and clinical, which have now been presented, seem to me to be sufficient to justify the surgeon in the apprehension of serious circulatory and nutritive disturbances after sudden and complete occlusion of the root vein of an extremity; of the upper extremity, when the occlusion of the main vein is accompanied also by the simultaneous occlusion of any considerable number of the lesser and collateral venous channels; of the lower extremity, when the occlusion is sudden, and has not been preceded by any conditions which might have occasioned a preliminary enlargement of collateral channels, or the development of new ones.

I proceed now to the consideration of the second question propounded, viz.: *What prophylactic effect, if any, would be exerted by the diminution of the force and volume of the arterial blood supply of the implicated limb?*

The celebrity of two cases where ligature of the femoral

vein, consequent upon acute injury sustained, had been followed by speedy and fatal gangrene of the leg, and the wide diffusion of the account of a case in which an obstinately recurring hæmorrhage from wounds of the femoral vein and many collateral branches had been at once controlled by ligation of the femoral artery, with uninterrupted recovery thereafter, has served to give the procedure of simultaneous arterial ligation a status as an authorized procedure in cases of wound of the femoral vein. The cases referred to are the well-known cases of Roux and Linhart and of Langenbeck. Following this trend of surgical opinion, Lidell, in 1883, in his article on "Injuries of the Blood Vessels," in the *International Encyclopædia of Surgery*, vol. iii., p. 213, says: "When hæmorrhage from the common femoral vein makes deligation of that vessel necessary in order to stop the bleeding, the common femoral artery should also be ligatured in most cases, in order to equalize the circulation."

But Braun had already, in the article of which so much use has been made in this paper, protested against this procedure as "one which appeared to him to be dangerous to the patient, and neither sufficiently warranted by clinical experience nor by anatomical investigation or experiment on the cadaver."

Fortunately the industry of this observer has furnished to us both the results of extended experiments on the cadaver and of a full compilation of recorded clinical experience. This it is possible for any one to analyze and make the basis of his own conclusions.

Pursuing our own analysis of these cases, we take up those in which arterial ligation has been performed, either as a remedy for wound of the femoral vein, or in consequence of a simultaneous arterial wound, and compare the results with those in which the vein alone was ligated.

Eleven cases are reported in which such arterial ligation was done for the relief of wounds inflicted in operations for the extirpation of inguinal tumors. In two of these the artery alone was tied; the first is the case of Langenbeck, already referred to, which proceeded to an uninterrupted cure; the second was one of Kuester's, where the wound in the vein had

been temporarily secured by hæmostatic forceps; the removal of these after twenty-four hours having been followed by renewed bleeding, K. proceeded to tie the femoral artery. This stopped the bleeding; but was followed by a rapidly progressive, fatal gangrene. Of the nine cases in which both the vein and the artery were ligated, there were five cases of gangrene, one only recovering after amputation. Of the four cases in which no gangrene appeared, two died from pyæmia and one from secondary hæmorrhage, leaving but one perfect recovery out of the entire class. This is in marked contrast with the results obtained in the same class of cases from simple ligature of the vein, and abundantly justifies the opinion that *in this class of cases* ligation of the common femoral artery is dangerous to the patient and unwarranted by clinical experience.

When we turn to the class of acute injuries a somewhat different result is found. Here are seven cases; in two of these the artery alone was tied; one followed by fatal gangrene, the other, although escaping gangrene, succumbing to pyæmia. Of the five remaining cases, two recover with little or no circulatory disturbance, three develop gangrene of the limb, of which two die, and one recovers after amputation. If we compare these with the cases of the same class in which simple ligation of the vein was done, and take the cases of gangrene alone into account, pyæmia being regarded as a preventable accident, it appears that where the vein alone was tied two out of five developed gangrene; where the artery was tied, either alone or simultaneously with the vein, four out of seven developed gangrene.¹ These numbers are not large

¹ NOTE.—In the discussion which followed the reading of this paper two additional cases of occlusion of both artery and vein at the level of Poupart's ligament were reported. 1. By Dr. Sands, who stated that in Bellevue Hospital, nine years ago, a man was admitted under the care of one of his colleagues with a wound of the femoral artery and vein. The bleeding was arrested, but gangrene supervened, quickly terminating in death. 2. By Dr. Weir, who stated that during the war of the rebellion he had a case of gunshot wound at the edge of the groin, in which it was found afterwards that the missile had torn the vein across and occluded the artery; gangrene and death resulted.

The published records of the results of gunshot wounds of the fem-

enough to settle the question positively, but as far as they go they likewise discourage the practice of ligation of the common femoral artery as a prophylactic measure after wounds of the femoral vein high up, even in acute injuries.

The case of simultaneous ligation of the femoral artery and vein which I presented to this society one year ago¹ lacks in an important particular the requisites necessary to enable me to use it for purposes of comparison with the cases under consideration. On account of the conditions under which the ligations were made, I did not determine at the time of the operation the exact relative location of the vein wound, but my belief has been that it was below the point of entrance of the internal saphenous. Such being the fact, the relation of the case as regards the amplitude of collateral channels is quite different from those in which a ligature is applied at the level of Poupart's ligament. Whether, also, the arterial ligature involved the common femoral or the superficial femoral, must also be a matter of doubt. This, however, is worthy of note, in this connection, that during the first few weeks after patient began to go about, a considerable œdema of the leg and thigh manifested itself. This entirely disappeared within a few weeks

¹ Annals of Surgery. Vol. 1. February. 1885. P. 167.

oral vein that came under surgical treatment during the war of the rebellion are not definite enough to be of much statistical value, nor, indeed, in any event, could the results of the military surgery of twenty years ago, in dealing with accidents of this character, shed much light on the results to be expected after such accidents in the private or hospital practice of to-day. The following, however, is given for what it is worth:

Two cases of gunshot wounds, involving both the femoral artery and vein, are recorded as having been treated, with death in each case.

Three cases of wounds of the femoral vein alone, all terminating fatally, one by pyæmia on sixteenth day, one on twenty-third day and one on eighth day, cause of death not given. These cases were treated by compression and styptics.

Of six cases, in which the external iliac artery was tied for wound of the femoral or profunda, or of these vessels and their accompanying veins, all were fatal.—*Med. and Surg. Hist. of the War of the Rebellion. Surgical Volume. Part II., pp. 13 et seq.*

and the man has ever since remained free from any disability from the injury. The case, nevertheless, will be found to have an important bearing as indicating a rational course of action to be pursued in the graver form of accident under consideration.

The extreme gravity of a wound of the femoral vein above the opening of the internal saphenous vein, in cases where there has been no pre-existing inguinal tumor, is seen in the fact that, of the twelve cases which have been analyzed, one half developed gangrene, all with fatal termination except in one case in which amputation was followed by recovery. This fatal gangrene is due to acute venous strangulation of the limb.

The immediate question which confronts the surgeon, therefore, is how to prevent this, or to diminish its intensity until a sufficiently free return of the venous blood is in some way provided for. Simultaneous ligation of the accompanying main arterial trunk has been shown by experience to increase the rate of mortality. Why this should be so it is not difficult to understand, for to diminish to an extreme degree the arterial supply to a part whose nutrition is already seriously compromised by general venous stasis, would certainly tend to precipitate and aggravate the threatened necrosis.

Braun (*loc. citat.*) founds his chief objection to the arterial ligation on that it deprives the arrested venous current of the *vis a tergo* which a full arterial current, bounding into the vessels of the limb, could exert, by means of which he believes that in some cases the valves of the chief collateral branches could be so far forced as to admit an immediate adequate collateral flow to take place through them.

If this theory were correct, an increase rather than a diminution of the arterial pressure in a limb would be an object to be sought in cases of the kind under consideration.

The physiology of the establishment of new collateral ways is, however, of quite a different character. It is by the dilatation and development of many previously minute and insignificant vessels that the new ways are established. Indeed, the experimental results of the anatomists referred to in the earlier part of this paper show without other observations that penetration of injected matter from the veins of the lower limb

into the pelvic veins, after ligation of the femoral, is not accomplished by overcoming definite valve-barriers and thus gaining access at once to wide paths, for if a thick and solidifiable injection material is used, no penetration is observed, but when a diffuent liquid, like turpentine colored with vermillion (Sappey and Nicaise), is used, then it flows with facility, for it now obtains entrance into a multitude of minute branches from the trunk into which it is first thrown, and then by multitudes of inosculating venules it is received and carried on until it is gathered together again in the larger veins that emerge within the pelvis, which finally convey it to the ascending vena cava. In the living subject the same phenomena are witnessed in every congested area where the rapid enlargement of previously minute and invisible vessels quickly supplies a part with a copious network of vessels now plainly discernible and capable of transmitting a greatly increased volume of blood. If the inundation of blood is more rapid and intense than can be provided for by this vascular dilatation, necrosis must take place, just as upon a larger scale it does in so large a proportion of the cases of sudden occlusion of the femoral vein at the level of Poupart's ligament. In cases of the accident in question the greater the arterial *vis a tergo*, the greater the danger of overwhelming and totally blocking the somewhat slowly enlarging collateral radicles. Where ample collateral paths already exist, it is unnecessary; where less immediately available collateral paths exist, it becomes an element of danger just in proportion to the absoluteness of their absence.

The idea, therefore, of obtaining any benefit in any case from the preservation of the full arterial pressure upon the circulation of a limb, whose chief vein has become occluded at its root, need never be entertained by the surgeon.

Having disposed of this consideration, the way is more clear to arrive at a conclusion as to what course is most likely to prevent the choking of the limb with blood, while the nutrition of the limb is still sufficiently provided for.

In the case of the lower limb I desire to suggest as a rational resource, and one least likely to entail new dangers, *ligation of the superficial femoral artery*. If this vessel be ligated, while the quantity of blood and the force of the cur-

rent through the limb will be very materially diminished, the amount of blood supplied to the limb will still be quite sufficient to provide for its nutrition.

Ligation of the superficial femoral artery is worthy of trial as a prophylactic measure in any case where sudden complete occlusion of the femoral vein has occurred at the root of the extremity. It is a rational means of accomplishing the immediate indication for lessening the amount of blood sent into the limb without endangering its nutrition. As an example in support of this practice my own case, above referred to, can now be cited. In this case the occlusion of the vein was at such a height that considerable œdema showed itself and persisted for some weeks after the patient began to walk about, although none had manifested itself while he was recumbent. The fortunate absence of serious disturbance of any kind in the limb during the early weeks after the ligature of the vein, and the comparatively speedy and lasting disappearance of the œdema are fairly attributable to the slight disturbance in the equilibrium of the arterial inflow and the venous output which the ligature of the superficial femoral secured. It is hardly necessary to state that in those cases in which a simultaneous wound of the common femoral artery and vein has occurred there is no choice of procedures but to ligate at the point of injury. In such cases it is especially important that the vein wound be closed, if possible, by a lateral suture or lateral clamp, so that complete occlusion of the vein may be avoided.

Recurring to the upper limb, since abundant experience has shown that the nutrition of that limb is not hazarded by a ligature applied to the axillary artery, ligation of that artery may unhesitatingly be performed as a prophylactic measure in cases in which diminution of the arterial supply to the limb seems desirable in consequence of extensive occlusion of the venous outlets at its root.

The final conclusions reached as the result of the foregoing discussion may be summarized in the following

RECAPITULATION :

1. Serious circulatory and nutritive disturbances are to be apprehended : *a*, in the upper extremity, when, in addition to

the occlusion of the main vein at its root, simultaneous occlusion of any considerable number of the lesser and collateral branches has also taken place; *b*, in the lower extremity, when the occlusion of the main vein at its root is sudden and complete, and has not been preceded by any conditions which might have occasioned a previous dilatation of collateral channels or the development of new ones.

2. The accidents of excessive œdema and of gangrene, when they occur, are due to the intense and active congestion of the limb, through the arteries, with blood for which there is no adequate outlet.

3. The development of collateral paths is not by the breaking down of valve-barriers at the entrance of large collateral trunks, but by the dilatation of a multitude of minute branchlets. To effect this an increased arterial *vis a tergo* is not required. Any increase in the normal blood pressure is attended with danger of overwhelming and fatally choking up the somewhat slowly enlarging collateral radicles.

4. The diminution of the amount of arterial blood which enters a limb whose chief venous outlets have become occluded down to an amount not greatly in excess of that which can readily find an outlet from it through paths still remaining, is the first great indication to be fulfilled in the treatment.

5. Whatever method is adopted to restrain the flooding of a limb with arterial blood, it must still permit the entrance of a supply sufficient for the nutrition of the limb. For this reason, in the lower limb, ligation of the common femoral is to be avoided, especially in the light of the disastrous results of such ligations already recorded.

6. Ligation of the axillary artery, in the upper extremity, and of the superficial femoral, in the lower, are safe expedients, and to be adopted as prophylactic measures, whenever occlusion of the venous outlets of a limb is so great as to hazard the integrity of the limb by reason of the circulatory stasis produced.

ON THE ADVANTAGES OF THE PRINCIPLE OF DRY DRESSINGS IN ANTISEPTIC SURGERY.

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THE discussion on the Treatment of Wounds at the recent International Medical Congress at Copenhagen differed in a remarkable manner from a similar discussion at the London Medical Congress in 1881. At the London Congress the great point at issue was whether the Listerian principle, that is the principle on which all antiseptic surgery was based, however varied in detail, had been fully established; and the opponents of the principle itself were many and strong. At the late Congress, however, all this was changed; the central point, round which the discussion turned, was the best method of putting the principle in practice. The principle itself found but weak, if any, opposition. Now, that discussion showed one thing conclusively, namely, that however much the principle was valued, however great had been the improvements imported into surgery by the rigorous adoption of Lister's method, still we had not reached finality, that still much remained to be done, and that there still were ends to be gained in our methods of dealing with operation wounds, which Lister's method did not reach.

"The ideal wound," says Mr. Watson Cheyne, "is a subcutaneous one, kept at perfect rest." That definition we may unhesitatingly adopt. By the rigid application of Lister's principle we are able to keep, not the air, but the harmful matters contained in the air and adhering to the surroundings, out of our wounds, and therefore we practically put them on the same footing as a subcutaneous wound. But even a subcutaneous wound will not heal kindly unless it be kept at

perfect rest, and in operation wounds we must keep the same principle before us as of the greatest importance. Now, to quote Mr. Watson Cheyne again, and I do so because he is the great exponent of the Listerian method, he tells us that the causes of unrest may be mechanical or chemical. The chemical causes are chiefly two; first and most important, the unrest due to the presence of organisms in the wound, a cause which aseptic surgery has abolished; secondly, the irritation caused by the antiseptic itself. It is not perhaps possible at present to remove this cause of unrest entirely, but it may be reduced to a minimum, at least to such a point that the irritation is not sufficient to interfere with the healthy course of the wound. This Sir Joseph Lister attains by the employment of a protective in the form of specially prepared oil silk which keeps the constant action of the carbolic acid out of the wound. Among the mechanical causes of unrest are especially to be noted movements of the part, the presence of foreign bodies in the wound, tension, whether from tight stitches, or retained secretions, etc. Now, it is in respect to some of these causes of unrest that Lister's method is open to improvement. Mr. Watson Cheyne allows so much when, in speaking of the ideal wound, he says: "We have not yet attained this ideal, for even with the aseptic method there is a certain amount of unrest caused by the antiseptic employed, by the stitches, by *the apparatus for drainage*, and by *the dressing itself*." Now, in this sentence we have lines laid down upon which we must travel if we wish to attain to the ideal.

No one will nowadays deny the importance, when possible, of infrequent dressing. The longer we can leave a wound undisturbed, without interfering with its aseptic condition, so much the better. The dressing of an operation wound causes disturbance both constitutionally and locally. We have frequently seen with what anxiety a patient, and especially a young patient, looks forward to the time of dressing, and in the most skilful and tender hands it is not often possible to remove a dressing, to cleanse the part, to take out or shorten the drainage tube and to put on a fresh supply of gauze, without causing to some extent pain; or even if pain be not in-

flicted the nervous dread of it is enough, in some patients, to make us wish that we could do without the change altogether. But even when we can neglect the constitutional disturbance excited, can we be always sure that the local movements of the part may not do great injury? Take for example such a case as an excision of the knee, even with the best devised splint, it is a matter of the greatest difficulty to prevent some degree of motion between the fragments when we are obliged to change the dressing, and often the result is materially influenced by it. Yet, again, frequent changing of the dressing exposes the wound to the danger of infection each time the wound is exposed, and though we may have good grounds for believing that the precautions we adopt to insure asepticity are efficient, still, if we can avoid running the risk, we should do so, provided that we do not lose sight of the great principle involved. What I maintain is that as long as we are obliged, by the nature of the dressings we use, to change those dressings frequently, so long we shall fail to obtain that rest for our wounds which is the groundwork of all systems of treatment.

Now with carbolic gauze dressings, we cannot have absolute rest during the healing process. In large wounds, or wounds from which there is much discharge, the dressings must frequently be removed within twelve hours, and in almost all wounds this must be done the day after the operation. Now, as the greatest amount of discharge comes away during the first twenty-four hours, if a fresh dressing is applied at the end of this time, we may be able to leave it on for several days, but it is never safe beyond a week. In many cases a change of dressings is required every second or third day; and the great guide for this is the appearance of moisture at the edges of the gauze. The reasons which oblige us to follow this course are mainly due to two causes, the volatile nature of the antiseptic and the small power of absorption of the material forming the dressing. We all know the ease and rapidity with which carbolic acid volatilizes, and hence the great difficulty we experience in keeping our carbolic dressings in a fit state for use. Oil of eucalyptus has the same fault, and even in the hands of Sir Joseph Lister himself, dis-

astrous results have followed from the deterioration of the dressings due to this cause. But in corrosive sublimate we have an antiseptic of far greater potency than either carbolic acid or eucalyptol, and one which has the great advantage of not being volatile at ordinary temperatures. Since the investigations of Koch, its power is established. A solution of 1 in 300,000 is sufficient to inhibit the development of organisms while 1 in 20,000 will destroy even the spores of the bacillus anthracis, the most resistant of all germs. Here then we have an antiseptic which will retain its power indefinitely in our dressings. When we use it, we need not fear that the antiseptic power of the material will deteriorate in a few days or even weeks.

Secondly, we find that one of the faults inherent in carbolic gauze is its small power of absorption. I have made several experiments to test the relative absorbing power of several materials which have been used for surgical dressings. Ordinary unprepared gauze, as we buy it in the shops, contains a certain amount of fatty substances which interfere with its absorbing power. Such gauze will absorb about three times its own weight of fluid; but if we first wash it in hot water with carbonate of soda we remove its fatty constituents and its absorbing power becomes thereby increased. It will then hold five times or five and a half times its own weight of fluid. A pound of such gauze, for instance, will, when fully saturated, weigh from six to six and a half pounds. But an equally important consideration is that it will absorb this rapidly, say in a few minutes. If a piece of this gauze be thrown on the surface of some water, it will in a few seconds sink to the bottom of the vessel. But it is quite otherwise with Lister's carbolized gauze. Being prepared with resin and paraffine, its absorbent power is very sensibly diminished. If thrown on the surface of water it will continue to float for hours and days. If completely submerged in water for twenty-four hours, it will absorb one and one-fourth times its own weight of fluid, while in three days the quantity of fluid it will take up will be only two and three-fourths times its own weight. This I have proved to be the case, not only with the carbolic gauze manufactured at the Adelaide Hospital, but also with that which we

buy in the shops. Thus we see that carbolic gauze holds a very low place in the scale of absorbing materials. In some places on the continent, notably in the hospital at Freiburg in Baden, gauze is use prepared with corrosive sublimate. It is first freed from fat in the way I have described, and it is then charged with corrosive sublimate, previously dissolved in water, to which a small proportion of glycerine has been added. When ready for use the gauze contains about 1 in 500 of corrosive sublimate, and will absorb about five times its weight of fluid. This makes a very nice dressing, but has the disadvantage of sometimes causing much irritation of the skin.

But we have other materials suitable for wound dressings which are far more absorbent even than the gauze freed from its fatty particles. The three most powerful in this respect are absorbent cotton, which will hold fifteen times its own weight; turf-moss, which will hold from eight to nine times, and wood-wool, which will absorb about eight and one-fourth times its own weight of fluid. Thus, absorbent cotton stands first on the list. But it has one great disadvantage, it does not possess that eagerness in absorption, as the Germans call it, which is possessed by turf-moss or wood-wool. What I mean by this is that if absorbent cotton be placed directly over a wound, if the quantity of discharge be very great, it will thoroughly saturate that part of the cotton which lies immediately over the point of exit in the wound, and will show itself externally long before the circumferential part of the dressing has even become damp. It is otherwise with the other two materials. Both wood-wool and turf-moss will gradually diffuse the discharge through the dressing until the greater portion of it has become nearly saturated before the external part of the dressing will show evidence of the discharge coming through. I have been in the habit of charging the turf-moss with corrosive sublimate in the strength of 1 in 400; the wood-wool is prepared with the same antiseptic in the strength of $\frac{1}{2}$ per 100. Both of these materials require to be put up into gauze bags previous to use, owing to the difficulty otherwise of applying them over a wound. Lately I have been using a combination of wood-wool and absorbing cotton, devised by von Bruns, of Tübingen, and I have little hesitation in say-

ing that it is the most convenient and suitable dressing I have hitherto found. It is composed of eight parts of wood-wool and two parts of absorbent cotton, so intimately mixed that it can be cut or torn into the size required and applied directly over the deep dressing without having recourse to gauze bags. Out of numerous trials I made of it I found on two or three occasions that it failed to keep the wound aseptic, and this failure I could attribute to no cause other than that which I now have reason to believe the true one, that the wood-wool wadding was not always reliable. It is prepared like wood-wool itself, with corrosive sublimate, but I have ascertained lately they contain the antiseptic in very different proportions. Wood-wool, as I have stated, contains 1 in 200 of corrosive sublimate, while wood-wool wadding contains only 1 in 3,000, This, I believe, is altogether too weak. I represented this to one of the firm of manufacturers, Messrs. Essinger & Co., and he has undertaken to prepare it for use of the strength of 1 in 1,000, which, I think, would be sufficient for our purposes. This material will absorb from nine to ten times its own weight of fluid, so that in this respect it stands even higher than wood-wool or turf-moss.

Now let me say a few words as to the advantage of using a highly absorbent material as a dressing for wounds. It dries the wound by sucking up from it the discharges as fast as they form, provided that there be a free vent for the discharges to reach the surface. This is well illustrated by the drying effect of blotting paper when applied to the wet surface of a freshly written page. This suction power, if I may so express it, is also used by microscopists to remove an excess of fluid from beneath the cover-glass. In a similar manner an absorbent material sucks up the fluid from a wound, and the more absorbent the material is the more rapidly it takes up the discharge. The importance of this is of the first order. "Moistening and putrefaction, drying and preservation, go together," says Mr. Gamgee, in a recent address¹ (and in this statement we must agree with him). "It is along damp courses and alluvial plains that contagia spread, not on sandy hills; so with wounds—the dry ones heal, the wet ones rot."

¹ *Lancet*, Oct. 17, 1885, p. 706.

But a highly absorbent material has another advantage. The more fluid it will absorb the longer it will take before it is saturated, and, therefore, the longer it can remain applied to the wound. That is self-evident. But the length of time such a dressing can remain undisturbed depends on other considerations also. In a typical Lister's dressing we know that not only is the wound covered with an impermeable protective, but that the carbolic gauze also is covered by an impervious mackintosh, which effectually excludes the air, and thus prevents the absorbed fluid in the gauze from evaporating. No doubt with carbolic gauze dressings this is absolutely necessary, as otherwise the volatile antiseptic would evaporate and the dressings become inert. But with an antiseptic so stable as corrosive sublimate this is quite unnecessary. We can allow free access of the air to the dressings, and that without fear that the antiseptic properties of the dressings will be materially affected. The dressings give up some of the fluid to the air, and are thus enabled to suck up more from the wound. It would thus appear that if we apply in the first instance sufficient material to prevent the discharge percolating through it within the first twenty-four to forty-eight hours, during which period the discharge is always most abundant, there would be no apparent limit to the length of time a dressing might remain undisturbed. The dressing would thus be a permanent dressing, and one of the most serious causes of unrest in the wound would be abolished. With such a dressing applied in a case where no precaution has been neglected to obtain absolute asepticity in the wound, there is no reason why the dressing should be disturbed at all during the healing process, except it be to remove a drainage-tube or other foreign body from the wound, such as unabsorbable ligatures or sutures. Now, in order to make this method of dry or permanent dressing perfect, we must either use exclusively absorbable ligatures, sutures and drainage tubes, or we must abolish them altogether. At present we cannot do without ligatures and sutures, but we can use exclusively those made of an absorbent material, and at present we possess nothing more suitable in ordinary cases than properly prepared catgut. And here let me say a word about the catgut. We use

almost exclusively at the Adelaide Hospital Sir Joseph Lister's chromised carbolic catgut, prepared by ourselves, according to the directions he himself laid down, and I cannot recall a case in which it proved untrustworthy, either by its remaining unabsorbed in the wound or by its absorbing too rapidly. It is only unreliable when it is improperly prepared. The same may be said of the catgut prepared with corrosive sublimate according to Neuber's method. This has the advantage of being very easily prepared. The raw catgut, which of course must be of good quality, is first washed with soap. It is then placed in sublimate solution (1 in 1,000) for twenty-four hours, after which it is transferred to a 1 in 1,000 solution of corrosive sublimate in alcohol. In this it is kept till required for use, or it may be preserved in oil of juniper. I have several times tried the catgut prepared with sulphurous acid, sometimes called the green catgut, but I have nearly always found that it remains in the wound unabsorbed for an indefinite length of time, and is very liable to keep a sinus open until it is discharged. So much for the ligatures and sutures. By using those made of proper materials we need have no fear as to their behavior under a permanent dressing. It is otherwise, however, with the drainage tube. Attempts have been made, both by Neuber, of Kiel, and Macewen, of Glasgow, to substitute absorbable drainage tubes for the rubber tubes usually employed. Without entering into particulars it will, for my present purpose, be sufficient to say that they have not been sufficiently successful to warrant their universal adoption. In many cases they have not been absorbed at all. Hence it was that Neuber devised a system of what may be called "natural drainage," by means of which the drainage-tube may be almost entirely abolished. I say almost, for drainage tubes are still of the greatest service in those cases where a large cavity has to be drained, as in empyema, psoas abscess, and the like. But in all ordinary operative wounds, such as removal of tumors, amputations, excisions of joints, even such joints as the knee and the hip, drainage-tubes can be dispensed with, not only with safety, but with material advantage. As the details of this method are not generally understood, let me shortly call your attention to the chief points to

be observed. In the first place, there should be absolute hæmostasis. Not only must the larger vessels be secured, but the capillary oozing should be checked. The best plan for this is, I believe, to fill the wound with sponges soaked in hot water containing about 1 in 2,000 of corrosive sublimate, and then drawing the skin together over the sponges to press with the hand till the solution is squeezed out of them. This has the double advantage of stopping oozing and of thoroughly antisepticising the wound. The next point of importance is to insure that there shall be no cavities left in the wound after the skin flaps have been brought together. If a tumor have been removed the space it occupied is abolished by carefully sewing together with catgut the opposing sides of the cavity in which the tumor lay. This is done by beginning at the bottom of the wound and inserting the sutures in successive tiers, until nothing is left but the skin, which is sewed together last. In an amputation, say of the thigh, the periosteum is divided from half an inch to an inch anteriorly to the place where the bone is to be sectioned. This periosteal flap serves as a cover to the divided end of the bone, and its edges are, in the first instance, carefully sutured together. Then the divided muscles are stitched together over this, as much as is possible. Fascia is joined to fascia, and finally skin to skin. In joining the tissues together in this way the deepest stitches are fastened most tightly. We make them a little looser as we progress towards the surface, and finally the skin sutures are the loosest. By this means the discharges are compelled to take a skinward course; in some cases canal-like spaces are left extending from the depth of the wound to a gap left between the skin flaps, or to an artificial hole punched in the skin, through which the discharge can escape. And let it be borne in mind that by this method of deep sutures the discharge from the wound is reduced to a minimum. Where spaces or cavities are left in a wound, there secretion is encouraged to form, and there it will not cease to collect, until by a process of granulation, or by the organization of a blood clot, the cavity ceases to exist; but when the divided parts are all carefully approximated, so that no such cavities shall exist, then the parts become rapidly agglutinated

and immediate union ensues. With this object in view we should always endeavor to suture periosteum to periosteum, muscle to muscle, fascia to fascia and skin to skin.

In carrying out these details it will appear that in order to carry off any discharge which may form, and to prevent the possibility of any bagging taking place, we must arrange for the exit of the discharge in that situation which each case will show to be most suitable. In some cases this is easy enough, but in others special circumstances must guide us. As I do not intend in this paper to enter into the statistical side of the question, let me give you here a few illustrative instances. In applying the method of dry dressings and buried or deep sutures to the radical cure of hernia, as soon as the wire sutures closing the rings have been secured, and all hæmorrhage has been arrested, I have in all my later cases sewn together first the divided layers of fascia. The edges of the skin are then brought together with a continuous suture, but the stitches have been put in obliquely, so as to draw more on one side than on the other, and in this way to leave a pucker at the upper angle of the wound, that is the end furthest removed from the pubis, and I have invariably found this pucker to be ample for the purposes of drainage. The dressings are applied as follows: A piece of sero-sublimate gauze is wrung out in carbolic solution and applied wet over the wound and over the contiguous skin. Then over this is placed either one or two pads of wood-wool or prepared turf-moss, and the whole is firmly bandaged on with an ordinary calico roller. With the exception of one case in which I used wood-wool wadding, which I believe now to be inefficient from an antiseptic point of view, every case has been left for ten days without the dressings being disturbed. When taken off on the tenth day I have in each case found the wound dry and soundly healed. In most cases the external portions of the catgut sutures have come away on the dressing, the internal portion having been absorbed. The pads were dry and caked. The same result exactly followed in the case of a woman æt. 33, the subject of an irreducible femoral epiplocele of the right side. In her case the sac and omentum were ligatured en masse close to the crural ring, and were then excised. I sewed together the ex-

ternal and internal walls of the crural canal, stitching them also to the pedicle. No special space or pucker was left for drainage, and when the first dressing was removed the wound was soundly healed. In none of these cases did any sinus remain to cause after trouble, as so often results when a drainage-tube has been used. On the 2d of April, last, I excised the right lobe of the thyroid gland from a lady æt. 34, who had been admitted into a pay ward in the Adelaide Hospital. A great portion of the lobe had been transformed into a large cyst. All the deep parts were carefully sutured together, so as to leave no spaces in the neck. A small pucker was left in the lower end of the skin wound. The wound was dressed with sero-sublimate gauze and turf-moss pads. The wound was perfectly healed on the tenth day, when the dressings were removed for the first and last time. The patient left hospital on the thirteenth day. In operating for cancer in the breast I have been in the habit for the past few years of completely cleaning out the axilla in all cases, as recommended by Kocher, of Berne. This proceeding of course renders necessary a much larger wound than when the breast alone is removed. In applying the principle of deep sutures I begin at the axilla, so as to obliterate the cavity necessarily left by the removal of all the lymphatic glands from the part. Then the fascia and any divided muscles are stitched together, and finally the skin, a gap being left at about the junction of the upper third with the lower two-thirds for drainage; that is, that in this situation about an inch or an inch and a half of the skin wound is not sutured. I have almost uniformly found the healing process completed under a simple dressing, when this was removed on the tenth or fourteenth day; in a few cases a second dressing was required. On the 27th of September last I removed the entire left breast for scirrhus from a lady in Waterford, æt. 71, assisted by my late colleague, Mr. Warren, and by Dr. Martin, of Portland, and Dr. Findlater. The axilla was cleaned out at the same time. Deep sutures were used; no drainage-tube was inserted, and the wound was amply surrounded with the dry dressings. I did not see her again for a fortnight, for as a record of the temperature was sent to me daily, and this remained normal throughout, I was satisfied that the wound

would run an aseptic course. On the fifteenth day the dressings were removed for the first time, and the wound was found soundly healed in its whole extent.

In certain cases, however, it is not sufficient merely to leave gaps between the edges of the skin to carry off the discharges, nor even do holes punched in the skin at the most depending parts effect all we can desire. In such cases we must have recourse to other methods for securing ample drainage. Take for example a case of excision of the knee-joint. Here we may expect a large amount of discharge, not only during the first twenty-four hours, but for several days. In such cases I have adopted a method of securing free drainage without the use of drainage tubes, for which we are indebted to Neuber of Kiel. The method consists in this: The incision to expose the joint is the ordinary transverse incision below the patella. The operation having been completed, before bringing the parts together the extremity of the incision at either side is made bifid, so as to enclose between them a narrow tongue of skin. The base of this tongue is below, the apex above. Each of these tongues is then turned inwards, so as almost to touch each other in the middle of the limb, behind the bones. The apices are secured in this position by means of a catgut suture. When the parts have been brought into position and all the suturing finished, we have on each side a channel formed, which runs from the deepest part of the wound to the outside. The dry dressings are then applied, and I prefer to have the splint embraced in them. Such a dressing can be left on for weeks. On the 4th of May last I excised the knee-joint of a boy, æt. 9, at the Surgical Home in Rathmines, in the presence of Mr. J. K. Barton, Mr. Warren, Mr. Swan and Dr. Swaine. The method for drainage described above was employed, the bones were sutured with strong silver wire, deep sutures were inserted and the splint and limb enveloped in dry dressings. These dressings remained undisturbed till the twenty-first day, and when removed the wound was found firmly healed in its whole extent, except for two small granulating spots about the size each of a sixpence, which showed where the skin had been turned in. They were quite superficial and soon healed. I saw the boy last on the 30th of October; he could then walk

well on the limb without support of any kind. There was no tenderness on pressure anywhere, even over the course of the two silver sutures in the bones, which have never been removed.

On the 2d of June last, I excised the hip of a little girl æt. 6 in the Adelaide Hospital. I found the head of the bone necrosed and lying loose in the cavity of the joint, which was filled with pus. About two-thirds of the neck of the femur was excised, and the cancellous tissue in the great trochanter and adjacent part of the shaft thoroughly scraped out. The acetabulum was also scraped clean. The lesser trochanter was also necrosed and lay in a small pond of pus. Deep sutures were also employed in this case, but owing to the large cavity which it was impossible to obliterate, I inserted two drainage tubes and left besides a wedge-shaped opening between them. Besides applying the dry dressings the wound was filled with iodoform. The case was dressed only on the sixth day, when the drainage tubes were taken out, and once again on the eighteenth day. When this dressing was removed, the healing process was found to have been completed. That is, that in this case of excision of the hip, perfect healing was obtained under three dressings. In September last my colleague, Mr. J. H. Scott, obtained a similar result. I have cited these cases, not because they are exceptional in our experience of what can be effected by the method of dry dressing when grafted on to the great principle of antiseptic surgery, but because they illustrate the different methods of carrying out this practice.

A CASE OF DEFORMITY OF THE FORE-ARM AND HANDS, WITH AN UNUSUAL HISTORY OF HEREDITARY CONGENITAL DEFICIENCY.¹

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A ARON MACINTYRE, æt. 73, six feet four inches in height, a pedlar by trade, and a native of New Hampshire, was admitted to the Philadelphia Hospital on March 7, 1885. His fore-arm and hands exhibited the following congenital deformity:

On the right side (see Fig. 1) the humerus is normal, except that its inferior extremity is rounded so that the condyloid notch is scarcely perceptible. In the fore-arm the ulna is absent, the radius forming

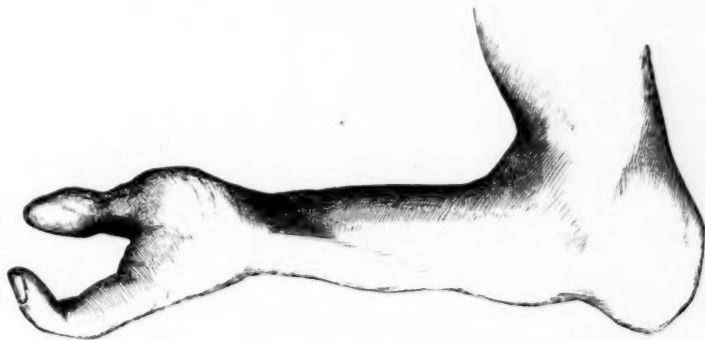


FIG. 1.

with the outer condyle of the humerus an articulation which admits of limited motion in all directions, but which does not admit of either complete extension or flexion. The carpal bones present are those which articulate with the radius, and the first two metacarpal bones.

¹ Reported at a meeting of the Pathological Society of Philadelphia, December 10, 1885.

The pisiform, cuneiform and unciform bones are absent. Of the metacarpal bones, only the first and second are present. The thumb and index finger are present and normal, except that the first phalangeal articulation of the latter is ankylosed and the finger is as a whole slightly curved towards the thumb. The third, fourth and fifth digits are wanting.

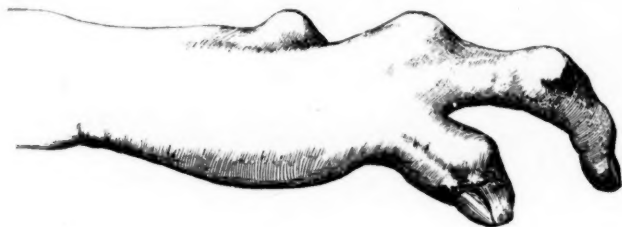


FIG. 2.

On the left side (see Fig. 2) no deformity is noticed until we reach the metacarpal bones, except that the olecranon process of the ulna is markedly curved towards the inner condyle of the humerus. Of the metacarpal bones the third is absent. The first and second each have a thumb, the two thumbs being united by connective tissue and skin, the thumb nails being contiguous, and each complete in itself. The



FIG. 3.

metacarpo-phalangeal joints are enlarged. The index finger is somewhat curved on itself. The middle and ring fingers are absent. This leaves a fissure between the index and little fingers which extends to the wrist, as shown in Fig. 3. The patient has considerable power in his hands, with full use of the parts present.

The following history of similar deformities in his family is interesting, and there is no reason for doubting the veracity of the patient's statements. His grandmother on his mother's side had one index finger stiff. Two uncles on his mother's side had each a stiff little finger. One sister had a hand deformed like the patient's left hand. She had a perfect child. Another sister's child had a hand deformed like his right hand. The patient has been married twice, and is the father of seven children. The two by his first wife were perfect. Of the five children by his second wife, two were perfect and three were deformed with malformations similar in character to his own.

Although many cases somewhat similar to or resembling the one above described have been reported, principally by Annandale,¹ to whom the reader is referred for a further clinical study of these affections, the unusual heredity observed in the present instance was deemed worthy of more than passing notice. Here heredity seems to have assumed unusual prominence, several generations having reproduced at one time or another malformations, which, although not absolutely similar, have been markedly so in the type and locality of the deformity. In studying the etiology of congenital malformations we find the subject surrounded by much that is mysterious and confusing, owing to the varying importance attached by authors to the influence of physical and psychical conditions of the patients upon the child in utero. I will not attempt to deal here with the very extensive question of predisposition to or inheritance of disease in general, but only briefly consider malformations, and especially those due to arrested development.

Hereditary similarities have been observed alike in the most extensive and most minute forms. These may vary from the shape of a particular part of the body, or of a special organ, such as the nose or ear, to the small pigment stain known as a "mother's mark." Accompanying these physical marks, similar mental tendencies and physical carriage can be observed for successive generations, giving to races and persons their marked individuality. In the same way that organs perfectly normal, but characteristic, are reproduced, physical defects and abnormalities are transmitted from parent to child.

¹ The Malformations, Diseases and Injuries of the Fingers and Toes. Annandale. Jacksonian Prize Essay. 1864. Philada. J. B. Lippincott & Co. 1866.

Most congenital malformations, especially those due to arrested development, have been referred to pathological changes affecting the child in utero. It being granted that the fœtus has its own circulation and nutrition, and that, consequently, disease of a part may take place resulting in effusions, exudations, atrophies and hypertrophies, with consequent marked nutritive changes, this will not account for all the malformations met with. For whilst these lesions undoubtedly cause certain deformities, it has been found experimentally, according to Wagner,¹ that malformations may be produced by wounding the ovum, and thus preventing the development of the part implicated.

Thus the action of mechanical agencies, such as blows, falls, etc., at an early period of gestation have a claim as causative agents in the production of anomalous development. The question of maternal impressions, through the influence of fright, shock, etc., is also to be considered and their possibility as factors cannot be entirely denied on *a priori* grounds, the literature of the subject abounding in many instances, where the relation of cause and effect are seemingly very clear. The result of the most recent investigations, however, would tend to show that the effects apparently brought about by these, are the results of foetal disease or spontaneous amputations. Simpson² and Montgomery³ have described cases where portions of the digits and extremities have been so amputated, and Simpson has called attention to certain rudimentary digits sprouting out from the end of the stumps. These effects have also been demonstrated by preparations, where it is shown that by the encircling of the extremities by turns of the umbilical cord, or by bands of false membranes, spontaneous intra-uterine amputations have resulted. Lastly, slight lesions in undeveloped foetal organs can cause great disturbances by preventing proper nutrition of the parts and thus the progress, size and quality of the organ being interfered with, the resulting adult development is either defective or entirely wanting.

¹ Manual of General Pathology. Trans. by Seguin and Van Dusen. New York. 1876.

² Simpson's Obstetrics, vol. II, p. 375.

³ Todd's Encyclopædia of Anat. and Physiology. "Fœtus"

These in brief are the causes of congenital malformations, and while many of the questions in regard to this class of cases are still in doubt, sufficient etiological explanation can be deduced in the reasons already stated for most of the cases met with, without resorting to apparent coincidences or fanciful theories.

A CASE OF LAPAROTOMY FOR INTESTINAL OBSTRUCTION—DEATH.

By S. J. BUMSTEAD, M.D.,

OF DECATUR, ILL.

JULY 13, 1885, Mr. P., æt. 27 years, during a severe paroxysm of coughing, was seized with persistent severe pain in the right inguinal region. When seen by his medical attendant, Dr. R. L. Walston, a few hours later, he was complaining very much of pain exactly over the right internal inguinal ring; no movement of the bowels could be obtained from this time. When seen by me, in consultation with Dr. W., two days later, the evidences of obstruction were unmistakable. The character and location of the original pain, together with complaints of pain extending down the spermatic cord to the testicle, made us quite confident that the intestine was engaged in the internal ring, although the gut could not be felt by the introduction of the finger up the inguinal canal. Satisfactory exploration of this kind was, however, difficult, on account of the thickness of adipose tissue over the region. Believing, however, that further delay with palliative treatment would not endanger too much the integrity of the bowel, a further delay of twenty-four hours was agreed to before instituting operative measures.

At the end of this period all of his symptoms had become aggravated, and operation was at once proceeded with. In this we had the assistance of Dr. C. A. McLean and Messrs. Prestly and Brown. An incision was made along the inguinal canal as for strangulated hernia, but upon reaching the internal ring nothing was discovered but a slight gush of fluid, which, for a moment, looked as though the intestine had been incised. This was, however, not the case, but no

knuckle of the intestine could be seen or felt by the finger with certainty.

The incision was then extended to the umbilicus and the abdomen opened fully, when several coils of the ileum, highly congested, presented themselves, but it required several minutes to detect the peculiar nature of the trouble. Directly posterior to the internal ring of this side, the bowel had, during the coughing fit no doubt, slipped through a rent in the omental apron at this point, and was retained there. After inflammation was established the omentum became attached to the external peritoneal layer in a circle surrounding the internal ring, and about four inches in diameter, just where by the pressure from behind it would naturally touch this wall, the knuckle of strangulated bowel being contained in this sac, and which contained the serum with fibrinous particles, which escaped when the external ring was reached. The constriction was soon released by making the rent in the omentum larger, and stripping apart the inflammatory adhesions, when the intestine was found very much congested, but otherwise in good condition.

The abdominal cavity was then very carefully cleansed with well cleaned sponges and warm solutions of the bichloride 1 to 3,000, while all instruments and hands coming in contact with the inside of the abdomen had been well cleaned in the same.

Inasmuch as peritonitis had been established and some of the peculiar exudation had been poured out, we thought best to insert a rubber drainage tube in the lower angle of the wound, when it was closed by deep interrupted sutures of carbolized plaited silk. Over all a large folded cloth saturated with the bichloride solution was laid, with the open extremity of the tube folded inside it, and night and morning the solution in same strength was injected through the tube and then allowed to run out, which it seemed to do upon each occasion. The reaction from the rather tedious operation was prompt, but unfortunately the next day the weather became very warm and continued so, the temperature in the hottest part of the day rising to 100° F. in his room, the house consisting of but two rooms on this floor, with a basement below, making very unfavorable surroundings for such a case. For two days his temperature did not exceed 101°, the third day, however, it began to rise and reached 102°, while an erysipelatous flush was observed about the wound, extending some inches on each side, as though septic products were burrowing between the muscular layers of abdominal walls. The temperature rose to 104° on the fourth day, diarrhoea set in together with nausea and vomiting, and he died about the middle of the fifth day after the operation.

EDITORIAL ARTICLES.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL SCIENCE IN ITS SURGICAL RELATIONS.

(Continued from Page 60.)

STERILIZATION—CULTURE SOILS.

In order to work with perfectly pure apparatus, instruments, etc., it is necessary that they should all be perfectly sterilized beforehand, that is, they should all be made free from germs which adhere to all articles that have been exposed to the air. This sterilization is the chief feature of the whole of bacterial science, and not only, as an art, requires a very great amount of practice to secure perfection in it, but necessitates a certain kind of mental training and intellectual bias in order at all times to fully realize the whole extent of damage which a slight inaccuracy or omission in conducting the experiments may lead to.

This sterilization must apply not only to the vessels used and the soils contained in them, but to all instruments used in transferring the germs, and to the surfaces which have to be penetrated in order to procure the matter for inoculation, and to the hands of the operators as well, in all manipulations of the latter kind. Recent investigators¹ have proved that the instruments and hands of the operators are by far a more frequent source of undesired infection, than the particles suspended in the air.

According to the different objects to be sterilized, different methods are, therefore, put into practice. And it must be borne in mind, that as we have to deal with different phases of development of the micro-organisms—(as the bacteria themselves, and their spores, from which the bacteria are supposed to develop in the course of their evolution)—the process which will destroy the one will not always destroy the

¹ *Herman Kümmell*, Die Contact und Luftinfection in der Chirurgie. Deutsche med. Wochenschrift. 1885. No. 22.

others as well—the spores being the more resistant both to chemical agents and to alterations of temperature.

The most reliable method of sterilization is by heat; this is applicable to all vessels, instruments, etc., and suffices, if properly applied, to destroy all the bacteria and spores which should by chance adhere to the apparatus.

Before sterilizing, the vessels, etc., must be thoroughly cleansed, which is done with the help of mineral acids, water, distilled water, alcohol and ether successively and in this order; the alcohol absorbing the last drops of the water and the ether, in like manner, the alcohol. The ether is allowed to evaporate. The necks of the vessels are then well plugged with cotton wads, which are generally sterilized at the same time with the vessels. The cotton admits of a circulation of air within the vessel, but filters off the germs suspended in the atmosphere. Although the cotton prevents any bacteria or spores from falling on the surface of the soils enclosed in the vessels, yet under certain circumstances fungi falling on top of the cotton may develop and, forming a mycelium, may grow through the whole substance of the cotton and, appearing at the under side of the plug, be brushed down into the vessel, when the plug is removed. When, therefore, a vessel plugged with cotton is to remain a long time exposed to the air, it is advisable to protect the upper surface of the cotton with some impermeable tissue.

The vessels thus prepared are then placed inside of a specially constructed metal box—"hot box"—composed of sheet-iron, with double walls enclosing an air-space. This apparatus is heated directly over a gas-flame, a thermometer registering the inside temperature and another instrument called the thermo-regulator graduating the heat by directly controlling the gas-supply by means of a column of mercury, which rises or sinks through expansion by the heat, and thus narrows or widens the passage-way admitting the gas.

The hot-box is kept at a temperature of 150° C. for a period of two hours. Apparatus thus sterilized is generally kept in the hot-box till used.

Metal instruments, such as knives, scissors, forceps, etc., may be

sterilized by heating them directly in a Bunsen flame; they are then layed on sterilized glass plates and protected by covers.

For sterilizing rubber objects, liquids, and certain kinds of culture-soils, which could not withstand so great a degree of dry heat, an apparatus is used called the *steaming apparatus* of Koch, Gaffky and Löffler. It consists of a large cylinder about half a metre in height and twenty centimetres in diameter, or more, manufactured of strong tin and surrounded by a coat of thick felt or asbestos to prevent the radiation of heat. A conical lid, holding a thermometer, sets loosely upon it, and at the juncture of the middle and lower third an iron grating is transversely fixed inside. Upon this grating the objects to be sterilized are placed, and, the space underneath being filled with water, a number of Bunsen burners are placed under the cylinder and the water heated to boiling. As soon as this is accomplished the cylinder is filled with steam, and *the thermometer registers 100° C. This condition is kept up for a period varying from half an hour to two hours*, according to the size of the articles to be sterilized. This apparatus is preferred to the "digestor," formerly much in use to sterilize fluids with hot steam under an increased atmospherical pressure, as being much simpler and equally effective. Immersion in boiling oil, paraffine, etc., which will often suffice for sterilization, is also less convenient; while simple boiling of a fluid is not sufficient to sterilize it (Schroeder¹). (Pasteur, of milk²). But some fluids, like blood-serum, cannot be heated to the boiling point of water without becoming coagulated; and yet it is desirable to sterilize them. Now a temperature above 52° C. will destroy all the bacteria and will not effect the coagulation of albuminous media. The spores, however, not being damaged by such degrees of heat, in the course of a few days, develop into bacteria; and these bacteria may then be killed by a repeated moderate heating (Tyndall). The apparatus in use for such purposes consists of a cylinder made of copper with double walls and furnished with a hollow cover. The space between the walls, and the cover is filled with water; the water is then warmed by gas flames, one being placed under the cylinder, the other under a lateral protuber-

¹ Annalen der Chemie und Pharmacie, 1861. Vol. 117, p. 273.

² Compt. rend., 1860. Vol. 50, p. 849.

ance of the cover. Three thermometers indicate the temperatures of the interior air-space and the two water-compartments respectively. The whole is covered with felt, and furnished with water gauges, escape-pipes, etc.

In this apparatus the charged vessels are kept at a temperature of 58° C. for a period of one or two hours for five or eight days successively. Other objects which cannot be exposed to heat at all, as the hands of the operators, etc., are sterilized by means of one-in-thousand aqueous solution of corrosive sublimate; the cleansing having been effected with soap and water and ether.

Turning to the preparation of cultivating media after Koch's methods, we must give our attention to potatoes, gelatine, isinglass and blood-serum soils.

The potatoes are cleansed by means of a nail brush and water, without injuring their epidermis; they are then laid in a one to five promille solution of corrosive sublimate for a period of about one hour, in order to sterilize them. The sublimate must then be again washed off with water, in order not to prevent the desired growth of the culture. The potatoes are then boiled for about one hour in the steaming apparatus in a suitable vessel and are then placed in covered dishes which are lined with filtering paper well dampened with corrosive sublimate solution. When cool they are cut in halves with sterilized cold knives, a fresh knife being employed for each potato, and the left hand of the operator, holding the potato, being freshly sterilized. The bacteria are then inoculated on the cut surfaces by means of a sterilized platinum wire, and the whole left in the moist glass chamber to develop under cover. The colony then, if the atmosphere be kept moist, soon begins to grow in every direction, and soon assumes a characteristic appearance resembling lichens on stones, and may be easily distinguished by its location from any accidental cultures having developed from germs which may have fallen on the soil from out of the atmosphere at the time when the cover was lifted off for the purpose of inoculating. If no germ be inoculated the potato pieces will remain perfectly sweet for an indefinite period, in the moist chamber.

Gelatine soils are prepared in the following manner: One pound of

finely cut or minced lean meat is placed in a dish, one liter of distilled water poured upon it, and the whole left in an ice chest for twenty-four hours. The infusion is then strained through gauze and enough distilled water added to make one liter. Ten gm. of dry peptone, 5 gm. common salt and 50 gm. of purest gelatine, cut into small pieces, are then added. When the gelatine has deliquesced in the course of an hour or more, it may be thoroughly dissolved by the application of moderate heat. The liquid is then usually acid in its reaction and must be rendered neutral or slightly alkaline by the addition of a sufficient quantity of carbonate of soda or carbonate of potassa. The mixture is then warmed up till it comes to a boil, and must then be filtered while still warm. To effect this a funnel is used made of copper with double sides, and lined with glass. The space between the walls is filled with warm water; the water is kept warm by a gas-flame applied to a projecting part of the funnel. The filtered liquid is then poured into sterilized test tubes or other vessels, and the sterilized cotton wads are replaced in the openings. These glasses are then sterilized by discontinuous heating as before described. The test-tubes are then ready for use. Instead of using the foregoing compound (Loeffler) as a soil, any other suitable soil may be used. Thus Hueppe gives the following receipt: Peptone 3%, sugar $1\frac{1}{2}\%$, extract of beef $1\frac{1}{2}\%$, gelatine 5%. In fact any of the former fluid media of Pasteur, etc., may be rendered solid by addition of a sufficient quantity of gelatine.

The liquefaction of the gelatine is often undesirable in cases where a growth is to be observed at a higher temperature than that at which gelatine remains solid. In such cases soils prepared with agar-agar, or Japanese isinglass, may be used. One and one-half or 2 per cent solutions of this substance are used. After the fine cuttings have been soaked in water for twenty-four hours in an ice-chest, they are thoroughly dissolved by boiling; the hot solution is then neutralized with carbonate of soda, and then boiled for two hours continuously in the steaming apparatus. The fluid is then to be filtered, either through gauze or through cotton or glass-wool inside of the straining apparatus (Rosenbach). Otherwise the technique does not differ from that of the gelatine.

In other cases blood-serum can be used as a soil for germ-cultures, since it can be rendered at once solid and transparent.

Sheep or ox-blood may be used, and it should be received at once into sterilized glass-stoppered vessels, the skin of the animal where the puncture is made having first been thoroughly cleansed and rendered aseptic and the first drops of blood having been allowed to escape. The vessels are then put away in an ice chest.

After about thirty hours the transparent serum may be drawn off by means of a sterilized pipette and filled into sterilized test tubes, which are then recovered with cotton and sterilized by discontinuous heating in the copper apparatus above described.

After perfect sterilization the serum is to be rendered solid, which is done in an apparatus consisting of a tin box with double sides and bottom, furnished with a glass top and covered with a layer of felt. The walls contain water, and heat is directly applied to the bottom. The blood-serum coagulates at 85° C., and becomes opaque; at a temperature of 65° C., however, it becomes solid, but remains transparent. The most perfect results are achieved if the temperature be kept between 65° and 68° C. The box is so placed that the floor occupies a slanting position, and so that the test tubes lie in an inclined and nearly horizontal position, the cotton wad designating the highest point; by this means the serum is solidified in a thinner layer and presents a larger surface for inoculation. Infusion of meat to an amount of 33%, peptone and grape sugar to an amount of 1%, common salt to $\frac{1}{2}\%$, and carbonate of soda to neutralize the solution, may be added to the blood-serum if desired. These ingredients should be previously mixed together and sterilized, and added to the serum after cooling. The whole must then be sterilized by the discontinuous method.

Some species of microbes grow on blood-serum soils and on none of the other ones mentioned. This fact is especially noticeable in some pathogenic germs.

Thus far we have only spoken of filling vessels and test tubes with the soils. But great advantages are sometimes to be gained by growing cultures on plane surfaces. For this purpose microscopic slides are used, having been previously duly sterilized. A small amount of liquefied gelatine is taken from one of the vessels with a sterilized

pipette and allowed to run out on the slide into a convenient layer for observation. They are then kept between sterilized glass dishes in a moist atmosphere, as was described in regard to the potato-cultures, and may be arranged in stacks by means of small sterilized glass ferules and plates.

The main advantage of these slide-cultures is the readiness with which they can be observed under the microscope, with low powers. If high powers are to be used it is only necessary to cover one of the colonies to be observed with a cover-glass, and then even immersion systems can be made use of.

It is advisable to use a more adherent soil for these slide-cultures and 10% gelatine soil is generally used in preference to the 5% solution used in the test tubes. A 2% agar-agar soil corresponds to a 10% gelatine.

As a rule these slide cultures cannot be kept pure for a great length of time, in consequence of germs from the air and apparatus falling upon the surface of the soil. But this is a matter of secondary importance, since the germs invading from without always develop at the point where they fall, and can be distinguished with the eye or with a lens from the inoculated colonies, as well as by their localization.

The *inoculations* of soils are performed with the greatest possible caution. A piece of platinum wire melted into a long glass rod forms the *inoculating needle*, which may be very quickly sterilized by heating it to a red heat in the flame of a spirit lamp; it is then allowed to cool each time before using.

The cotton wad is then loosened in the mouth of the test tube, where it has generally become impacted by the sterilization process, by means of forceps sterilized in the flame. The test tube is then turned upside down and held in an inverted position, while the inoculation needle is charged by dipping it into the matter to be examined. The cotton is then quickly removed by other fingers of the same hand holding the needle, and the needle thrust a considerable distance up into the gelatine. In this way the inoculation puncture is obtained, some of the material being deposited on the surface of the gelatine at the point where the needle entered, and some being distributed along the course of the puncture in the gelatine. The colonies developing

in these two different localizations differ in so far as the air of the atmosphere has access to the one and not to the other. The needle is then withdrawn, the cotton replaced and the test tube put aside in a convenient stand for observation.

Care must be taken in handling test tubes with gelatine soils, not to inclose them in the palm of the hand; the gelatine becomes liquified at blood heat, and the cultures can no longer remain strictly localized in a liquid soil.

If the cotton have been exposed to the air it is serviceable to burn the upper part in a flame before removing the wad, so as to destroy any germs that may have developed there.

Inoculations into agar-agar soils are conducted in the same manner. Blood-serum is only used for surface cultivations, it being not sufficiently transparent in thick layers. The inoculating needle, charged with the germs, is simply drawn over the oblique surface of the solidified serum, the test tube being held horizontally.

Slide soils are inoculated in a similar manner. The platinum wire charged with the matter to be examined is drawn quickly across the gelatine surface in parallel lines at right angles to the length of the slide. This is best done just after the gelatine has been spread upon the slide while it is cooling, when it is just at the point of solidifying. In this manner the colony is inclosed in the gelatine lying just beneath the surface.

The matter to be inoculated should also receive attention, so as to save the trouble of uselessly inoculating other germs than those intended. In inoculating matter from dead subjects the transferring of the secretions or parts of organs should be accomplished as soon as possible after death. The skin to be cut through should first be cleansed and disinfected with corrosive sublimate solution (1 in 1,000) and kept moist during the manipulations, to prevent the germs rising into the air. The first incisions through the skin are then performed with recently sterilized or hot instruments (Koch). All succeeding incisions are performed with a new set of hot instruments, fresh forceps, scissors, knives, etc., being employed for each successive layer of tissue—the material to be inoculated, however, must not be touched but with cold sterilized instruments, for fear of destroying

the vitality of the germs to be examined. In this manner the danger of contaminating the material used for inoculation with micro-organisms from the peripheral portions of the organ is avoided. Excised organs are first to be washed in a one in twenty solution of carbolic acid for the space of ten minutes and subsequently for five minutes, in a one-pro-mille solution of corrosive sublimate for the purpose of destroying the spores, before cutting them open and proceeding to inoculate as above described (Loeffler).

If syringes are to be employed they must be constructed without India-rubber, so that they may be perfectly sterilized by heat. The glass piston is wound about with cotton and silk thread each time anew and the whole sterilized at a temperature of 150° C. before using. The air-tight fitting is secured by means of fresh pieces of cork inserted between the glass cylinder and the metal mountings. Similar precautions are necessary when inoculating animals with the different germs.

As we have seen, the main object is to attain pure cultures, that is to say, colonies formed only of one single species of germ. But since the matter to be examined most usually contains a mixture of different kinds of micro-organisms it is necessary to separate them. This object is achieved by means of plate cultures. Large pieces of plate-glass, 10 by 12 centimetres, having been duly cleaned and sterilized, 10% gelatine soil is liquified by heat in its vessel, and while in a liquid state, is inoculated with a trace of the matter by means of the sterilized needle. The vessel is then shaken so as to distribute the germs throughout the fluid, and when the gelatine begins to solidify it is poured out upon the glass plate. These glass plates are then stacked in moistened glass covered dishes and put by for observation.

By this means the germs are separated, and can develop into *colonies* at different points in the gelatine; they can be studied with the magnifying glass, and can be subsequently separately inoculated into other plate cultures, onto slides, and from there into test tubes, etc. In this manner pure cultures can be comparatively easily obtained.

If the number of germs contained in the matter to be examined be too great, a drop of the matter may be first added to a quantity of sterilized distilled water and a trace of this water, after agitating, be used to inoculate the fluid gelatine. Or, series of test tubes with fluid

gelatine may be used to raise the first inoculation to a second, third or fourth dilution, by transferring one or more drops from one tube into the next, and so on, and then preparing plate cultures.

If, however, the germs to be investigated will only grow on blood-serum, special care must be taken to have them in as pure a state as possible from the start.

The cultures all present a characteristic appearance to the naked eye, and especially when viewed with a lens. They differ in color, transparency, humidity, gloss, etc. They often affect the soil, changing its color, its consistency, its odor. Thus many micro-organisms liquefy the gelatine soils when they develop, and some more rapidly than others; in the one case the gelatine is completely turned to a liquid in its upper portion; in the other, only a funnel-shaped zone of liquid is formed. Some species of organisms can only grow on the surface of gelatine soils, where the air has access, and are impeded in their development when a thin piece of isinglass is laid over the colonies upon the surface of the gelatine. Others will only develop when the soils (agar-agar) are kept at a certain temperature, as that of the body. Again the development of germs differs with the soil and with its constitution, its acidity, the presence of grape or cane-sugar, peptone, etc.

The methods detailed may appear in part very circumstantial and tedious, but there is hardly any science which requires so strict an adherence to details and where a desire to expedite matters and to shorten the methods is followed by such disastrous results.

SUPPURATION IN GENERAL.

Blood of the healthy subject was formerly very generally believed to contain micro-organisms; and even when Pasteur, Burdon Sanderson and Klebs denied this, many observers still held to their former opinion till Koch was enabled by his improved methods of staining and illuminating to corroborate the statements of the above-named authorities.¹ But pus from phlegmonous suppurations had always been known to contain micrococci, and, therefore, as soon as it was proved that micro-organisms did not *normally* exist in the tissues it ap-

¹ R. Koch. Untersuchungen über die Aetiologie der Wundinfections Krankheiten. Leipzig. 1878. Translated by W. Watson Cheyne, Sydenham Soc. 80.

peared natural to suppose that all acute suppurations were produced by the presence of micro-organisms, and accordingly we find this to have been the prevailing opinion of pathologists during the last ten or twenty years, based upon certain writings of such authors as Hueter, Klebs, Lister, Kocher, Koch and Ogston.

At this time Uskoff, working with the assistance of Ponfick, of Breslau, published a series of experiments on dogs,¹ in some of which he had succeeded in obtaining suppuration without, as he believed, introducing bacteria into the tissues. He found that chemically indifferent fluids, as milk, distilled water, olive oil, when introduced into the subcutaneous cellular tissue only once, and in small quantities, did not excite suppuration, but that larger doses or repeatedly injected doses did excite active inflammation and suppuration. Even pus containing micro-organisms did not always call forth suppuration when small quantities were employed. Some of the inflammatory products contained organisms, others did not. Chemically irritating liquids, as croton oil, oil of turpentine, produced suppuration in all cases except when minute quantities were injected with olive oil, and in all but one of the severe inflammatory processes obtained by this method micro-organisms were absent.

Uskoff concluded that suppuration did not always depend upon the presence of micro-organisms. Although it was subsequently clearly proved that many of Uskoff's experiments were not convincing, that his technique was faulty, his methods of sterilization inadequate, and, therefore, his conclusions not reliable, yet his paper was of very considerable importance, both on account of the incitement it gave to further experimentation, which served to throw more light upon this subject, and because it represented, in a tangible form, a reaction which could not but occur in opposition to a certain school of enthusiasts in bacteriology, who began to regard all suppuration and inflammation as due to the presence of micro-organisms—a school represented by the followers of Hueter's doctrines and zealous advocates of Listerism.

¹ Virchow's Archiv. Vol. 86. "Giebt es eine Eiterung unabhängig von niederen Organismen?"

Indeed, so popular did this school threaten to become that Prof. Lister thought it necessary to utter a note of warning, and, in an address on the relation of micro-organisms to inflammation held in London before the pathological section of the International Congress of 1881, pointed out that inflammation might be due as well to nervous action, "sympathy," "irritation," etc.; and Volkmann, in his address on the changes which surgery had undergone during the last ten years, delivered at the same International Congress, argued that the belief that inflammation was due to the action of organic germs did not harmonize with the state of medical knowledge at that time—a view expressed in Cohnheim's writings.

A most important experimental contribution called forth by Uskoff's experiments was that of Orthmann.¹ Working with the assistance of Rosenbach, of Goettingen, with the strictest antiseptic precautions and with perfectly sterilized instruments, he found that he could inject even very large amounts of indifferent fluids under the skin of animals, and, as frequently as he desired, without causing an abscess or even a trace of suppuration. But as soon as he employed oil of turpentine, mercury, or other chemical irritants, he could produce phlegmons and abscesses even with minute quantities. Pus from these abscesses, when inoculated upon soils, did not lead to the development of any colonies. He did not, however, inoculate soils with the injected oil, which he had sterilized by heating in the steaming apparatus (100° C.) for half an hour.

But to these experiments of Orthmann, Councilman, of this country, now raised objections. He argued that although no micro-organisms had been found in the pus of these abscesses, they might, nevertheless, have been the cause of the suppuration; they might have subsequently entered through the aperture made in the skin by the injection-needle, the walls of the puncture-canal having been rendered necrotic by the action of the chemicals; or they might be situated in the walls of the abscess and have escaped notice, while those in the pus itself had perished. Koch had not been able to see bacteria in the pus of abscesses of rabbits with the microscope, but had found them in the abscess-walls.

¹ E. G. Orthmann, über die Ursachen der Eiterbildung. Virch. Arch. Vol. 90.

He therefore performed a series (sixteen) of similar experiments in Cohnheim's laboratory,¹ taking the precaution to inclose the chemical irritant (olive oil and croton oil in proportion of 5 to 1) in glass capsules or tubes, which he sterilized and introduced beneath the skin of rabbits with antiseptic precautions. The wounds healed without the least inflammatory reaction, and when this was accomplished the capsules were fractured subcutaneously. Suppuration ensued in all cases except in those where bland saline solutions were used.

Councilman therefore concluded that his experiments corroborated Orthmann's results, although he believes the theory of spontaneous suppuration being produced by micro-organisms to be in no wise affected by these experiments, since chemical irritants do not appear spontaneously in the tissues, but are either accidentally introduced or are the products of micro-organisms.

Rosenbach objected to these experiments, that although there might not be a sufficient quantity of micro-organisms adherent to the capsules to alone set up a reaction in the tissues, yet when the irritation of the chemicals was superadded, they might commence action.

But a more serious objection than this is applicable to Councilman's experiments, being the same which was made to Orthmann's, that the sterilization of the fluids injected had not been tested as to its adequacy by inoculation experiments. This precaution appears of especial importance, since Passet found that certain forms of bacteria were difficult to destroy in oily fluids.² Thus, in a series of experiments, performed in the Munich laboratory with the assistance of Prof. Frobenius, he found that spores of charbon resisted a steam temperature of 100° C. for five hours when suspended in oil, though they were destroyed in one hour when suspended in water; but that a temperature of 145° to 150° G. for one hour sufficed to kill the spores. Arguing that bacteria introduced into the tissues might have a similar resistance as charbon-spores, Passet repeated the experiments of Councilman, but exercising a complete control by means of the culture methods. He sterilized the glass capsules as he had done the charbon ones,

¹ "Zur Aetiologie der Eiterung." Virch. Arch. Vol. 92.

² Untersuchungen über die Aetiologie der eitrigen Phlegmone des Menschen. Dr. Joseph Passet. Berlin. 1885. Fischer's Bchhdlg.

and antiseptically introduced them beneath the skin of rabbits and guinea pigs. After one or two weeks he fractured them, and examined the abscesses after one or three more weeks. He found that such capsules as had been filled with pure olive oil, solution of common salt, or with small fragments of glass, did not call forth any reaction, but that oil of turpentine produced abscesses of the size of a nut in five cases out of seven, and several smaller abscesses in one case; and that croton oil mixed with olive oil (one in five) produced a similar abscess in about a week. The abscesses contained pus. Neither the fluids used, nor the pus, nor the abscess-walls contained micro-organisms when examined with the microscope or by means of culture methods.

The author therefore concludes that chemical irritants are capable of producing suppuration without the presence of micro-organisms.

Quite recently, however, Scheuerlein¹ has published similar experiments, which differ somewhat as to the results obtained. He used similar glass tubes of two sizes, one containing one drop, the other four drops of liquid (the latter about two-thirds the amount held in Passet's capsules, which contained 0.225 ccm.) which he sterilized by heating in steam of 100° C. for half an hour. These he introduced with antiseptic measures beneath the skin of rabbits. Thirty-two experiments were performed. No reaction followed the introduction of the tubes. They were fractured after one or two weeks; and in two days a tumor could be felt, increasing up to the fourth day, and decreasing after the twelfth day. Examinations made about the fourth or the eighth day revealed new formation of infiltrated connective tissue: no micro-organisms were traced by the microscope or by culture experiments, and *no suppuration* ensued in any case. The tubes were filled with oil of turpentine, croton and olive oil (1:5), ol. sinapis, caryophylli, macidis, sabinæ, cajeputi, juniperi; while others were filled with infusion of ipecacuanha (5 in 50), decoct. fruct. capsici (the same), tartar emetic, oil of cantharides and formic acid. Those of the latter group were, however, less effective in their action.

¹ Ernst Scheuerlein. Die Entstehung und Erzeugung der Eiterung durch chemisch. Reizmittel. Archiv. für klin. Chirurg. Vol. 32. II.

The conclusion arrived at was that small quantities of chemical irritants do not, in any case, excite suppuration, but only inflammation.

It appears of interest to note here that Rosenbach, so long ago as 1878,¹ found that croton oil applied to healthy bone-marrow would produce phlegmonous suppuration, which he could also produce by means of infections, but not by purely mechanical means or heat. These statements were afterwards endorsed by Kocher.

W. VAN ARSDALE.

¹ Deutsch. Zeitschr. für Chirurg. Vol. 10. P. 369.

[To be Continued.]

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. On Tubercularization of Wounds. By Prof. KRASKE (Freiburg). Local relapse after operations for tubercular disease is well known; not so the fresh infection of a non-tubercular wound; one such possible case was published by König, but it was not conclusive. Kraske presents two cases which he considers demonstrative.

1. Boy, æt. 11. Parents and a brother healthy, sister æt. 15 years consumptive. Osteomyelitis of right femur. Two years later there remained a couple of fistulæ; one of these was opened and some bone chiseled off (no sequestrum) and the granulations removed. The other fistula then closed. Primary union of the incision down to the drainage opening. Discharged in three weeks with a nicely granulating surface. Readmitted seven months later. The wound had not healed—on the contrary there were two additional openings with fungous cheesy granulations. The appearance and secretion of the wound were much worse. It had been dressed daily in a small room where lay his sister, who recently died of tuberculosis; he slept and his bandages were kept in the same chamber. The healed fistula had remained healed. The bone to the extent of the defect made at the first operation and a depth of $1\frac{1}{2}$ to 1 ctm. was carious. That it was a pronounced tuberculosis was clear. Microscopical examination of the granulations and bone showed numerous miliary tubercles and after much trouble also scattering but definite bacilli. The sore was dressed with iodoform gauze and the patient dismissed in six to seven weeks, the wound not quite healed.

2. Boy æt. 10. Mother and maternal aunt and grandparents died of phthisis. Osteomyelitis of left femur in Nov., 1884; admitted to clinic in June, 1885. Internal organs healthy. Leg shortened 7 ctm. by an angle in the femur—evidently resulting from a reunited fracture.

The bone at this point was much enlarged; two fistulæ, one on the outside and one on the inside. Sequestrum of bone could be detected. Operation under constriction. Exquisite fungous cheesy granulations extended about $2\frac{1}{2}$ ctm. deep along the inner fistula; these were recognized macroscopically and proven microscopically to be tubercular (bacilli). Material from other parts of the tract and the external fistula was free from bacilli. Further course of the case favorable, correcting the deformity was left for a later operation. The evidence in favor of his views of the two cases, as already indicated, is then reviewed and strengthened. K. raises the question whether the previous osteomyelitic infection did not exert some special influence favoring the development of tuberculosis in the wound.—*Centbl. f. Chirg.* 1885. No. 47.

W. BROWNING (Brooklyn).

II. Hydronaphthol; a New Antiseptic. By G. R. FOWLER, M.D. (Brooklyn, N. Y.) Hydronaphthol, a member of the phenol series and represented by the formula $C_{20}H_{13}O_3HO$, has been used successfully as an antiseptic, particularly as a substitute for carbolic acid. The writer finds it to be non-irritant, non-poisonous, non-corrosive, non-volatile at ordinary temperatures, and second only, as an antiseptic, to corrosive sublimate. From a considerable number of experiments upon its action upon beef solutions it was concluded (1) to have failed to disinfect decomposed beef tea, containing pathogenic organisms and spores, when present in 0.5 per cent; (2) not to prove germicidal to pure anthrax, pure subtilis and pure micrococci in the same strength; but (3) as an antiseptic it proved to be active in arresting the development of bacteria in the proportion of 1 to 6000 and failed only when the 1 to 8000 solution was reached. Like results were obtained in a series of experiments upon fungi in an incubation liquid composed of grape sugar, potassium phosphate, ammonium nitrate and distilled water, a 1 to 2000 solution completely checking the fermentation of yeast. A solution for surgical use, 1 to 1100, is made by adding a sufficient quantity to a teacupful of hot water to supersaturate it, producing a milky mixture; enough water at the ordinary temperature is then added to this to make a clear solution. Silk, catgut, sponges, drains, etc., are first sterilized by immersion in a mercuric chloride so-

lution and then preserved in a hydronaphthol solution. Dressings are prepared by saturation with a 1 to 500 solution in which mercuric chloride is dissolved in the same proportion, the latter, by its germicidal action, destroying any possible source of infection and the former as a permanent antiseptic: The power of hydronaphthol as an antiseptic is shown by a series of eleven cases, illustrating its effect, and the paper is closed by a detailed description of the methods of preparation of the various articles in which advantage is taken of its antiseptic properties.—*N. Y. Med. Jour.* 1885. Oct. 3, 10, 24, Dec. 5.

III. Theine, a New Analgesic. By T. J. MAYS, M.D., (Philadelphia). Theine is the active principle of the leaves of Chinese tea, and in physiological doses, it paralyzes sensation before motion, impairs sensibility from the centre to the periphery and produces convulsions which are spinal, not cerebral. The author concludes from its physiological action and its action in two cases of obstinate neuralgia, which he quotes, that it is a powerful anodyne which produces none of the intoxication of the higher nerve centres so common with morphia and all other agents belonging to this class. Its influence is quick and persistent, manifesting an almost exclusive affinity for the sensory nerves and in $\frac{1}{10}$, $\frac{1}{5}$ and even $\frac{1}{3}$ grain doses it is entirely free from dangerous consequences and may be exhibited hypodermically in a 1 per cent solution.—*Med. News.* 1885. Dec. 12.

J. E. PILCHER (U. S. Army).

IV. Poisoning with Fibrine Ferment and Its Relations to Thrombosis and Embolism. By Dr. E. VON DUERING (Erlangen). The object of this interesting paper, written at the suggestion of Prof. Heineke, of Erlangen, by his former assistant, was to determine, by means of experimental evidence, whether the ferment forming fibrin in the blood can pass from an extravasation through the walls of healthy vessels and there effect local thrombosis.

The question is answered in the affirmative and the following conclusions arrived at:

1. The fibrin ferment contained in coagulating extravasations of blood enters the vessels of the region affected, by diffusion. 2. For this reason extensive intravascular coagulation takes place as soon as

the blood current in the vessels is impeded or interrupted. 3. If the blood-current be not impeded small coagula are formed in the coursing blood, and, being swept away by the current, finally form innumerable emboli in the capillaries and minute arteries of every organ, thus causing the condition known to the pathological anatomist as fibrin-poisoning. 4. But in those cases as well where thromboses are locally formed, a number of minute particles are torn away from the coagulum by the blood-current and lodged in the capillaries, so that even in these cases general symptoms of fibrin-intoxication are not wanting.

In the first part of the paper the author gives a short résumé of Alexander Schmidt's theory of fibrin-formation, which he adopts, refuting Bizzozero, and reviews Angerer's investigations.

In the second part he details some experiments which he conducted by ligaturing the various vessels and making perivascular injections of blood containing ferment, or by directly wounding the arteries subcutaneously. He found that even in exsected ligatured arteries the blood remained fluid for a long time. When these were immersed in blood-serum the coagulation took place sooner, although putrefactive processes here play a part. Injuries done to the vessels always caused coagulation. Perivascular injections of blood were followed by no local disturbances unless ligatures were applied to the vessels or a tourniquet to the limb. These results explain why, after surgical ligature of a main artery, gangrene of the limb is a much more frequent occurrence when hæmorrhage is present.

Lastly, the author argues from numerous microscopical examinations of sections through almost all the internal organs, that capillary embolisms constitute the essential conditions of fibrin-poisoning, thus rejecting Koehler's theory of capillary thrombosis.

The paper is nearly fifty pages in length, eighteen of which are taken up with descriptions of experiments.—*Deutsch. Zeitsch. f. Chir.* Vol. 22. Hft. 5. Oct. 6, 1885.

V. On the Antiseptic Properties of Subnitrate of Bismuth and Some Other Substances. By Dr. CARL SCHULER. Acting upon a suggestion made by Prof. Kocher, of Bern, who had found iodoform powder too dangerous a dressing to be used freely on

wounds, the author undertook a series of experiments with a view to finding a substitute for iodoform, which should possess similar antiseptic powers and yet be harmless. The first experiments consisted simply in rubbing different chemical substances upon pieces of fresh meat, and then determining by means of their odor how long they remained sweet. The powders used were alum, iodoform, burnt magnesia, carbonate of magnesia, subnitrate of bismuth and zinc oxide; lime water, oil of juniper and other solutions were also used. His further experiments were soon limited to subnitrate of bismuth, zinc oxide and iodoform, the first of which subsequently absorbed his entire attention.

The accounts of these latter experiments alone fill nearly eleven pages, the action of the bismuth upon meat, fresh pieces of pancreas and gelatine being separately considered. Development of bacteria was not observed for several days in these experiments, and other signs of putrefaction did not appear for several subsequent days. The development of bacteria on gelatine soils was prevented by the addition of 1 per cent of bismuth.

The author gives the following *résumé* of the clinical aspect of the subject, although the paper contains no clinical data nor cases:

1. Subnitrate of bismuth possesses antiseptic properties at least equal to those of iodoform.
2. No poisonous effects are to be apprehended as in the employment of iodoform.
3. The subnitrate of bismuth, being a chemically indifferent substance, does not irritate the wounds; secretion is diminished.
4. Its action is very prolonged, though not vigorous, so that the dressings do not require to be frequently changed, and rest is insured for the wounds.
5. There is no action at a distance, nor does any specific effect attach to it.
6. It does not afford protection against erysipelas and other wound diseases, at least no more than iodoform.
7. It is no disinfectant, but as an antiseptic it keeps the wounds pure.
8. All wounds capable of healing by first intention can do so when dressed with bismuth.
9. It also represents an excellent material for forming scabs under which epidermis can grow over the wound. Its use on granulating wounds has not, however, been sufficiently studied as yet.

As an appendix to this paper some remarks are given of Prof.

Langhan's, of Berne, on the pathological changes in the kidneys and intestines in animals poisoned by subnitrate of bismuth.

Metallic deposits occur in the tissues, occasioning necrosis and sloughing.—*Deutsch. Zeitschr. f. Chir.* Vol. 22. Hft. 5 and 6. Oct. 6, 1885.

W. VAN ARSDALE (New York).

NERVOUS AND VASCULAR SYSTEMS.

I. Statistics of Aneurysms, Especially of the Aorta, and on Causes of Same. By Dr. C. M. RICHTER. (San Francisco.) Attention is first called to the recognized frequency of aneurysm in San Francisco, and doubtless in all California. The foreign element in the population nearly equaled the native in 1870; it had increased somewhat relatively in 1880. Since few but strong people, and those having some little means went there before the railroad was built—the same holds largely still—and the climate is favorable, the mortality, exclusive of the Chinese, is very low. But owing to the higher wages and favorable prices of food—both of which, in comparison with London and New York, are shown by tables—more work is required and can be done than in most older localities. Longshoremen especially show this; they get high wages, are frequently subject to excessive and prolonged strain, such as carrying heavy loads, etc. They furnish the largest contingent of aortic aneurysms. Again, drunkenness is very prevalent. Berlin's average for five years gave 30 deaths from alcoholism in 1,000,000 deaths; Cincinnati gave 150; San Francisco 280. Of the fifty-one persons dying from alcoholism in San Francisco in 1884, thirty were foreigners and seventeen were from the Western States.

In 1867 Soule published thirty cases of aortic aneurysm from the City Hospital (occurring within two and a half years); of these 24 were foreigners; most of them were drinkers, and either sailors, longshoremen or soldiers. But one was married, and there was one woman—the only one of the thirty born in California. The aortic arch was the seat in one-half, the descending aorta in one-third, and the abdominal in one-sixth. After Soule came Gibbons, who calculated that there were 150 deaths from aortic aneurysm amongst 10,000 in San

Francisco, while Philadelphia showed but 6, and Boston and England 9. Soule in 1868 calculated a yearly average of 42, or 1 death from aortic aneurysm to 3,000 inhabitants, while at the same time there was but 1 to 27,000 in New York.

From R.'s large number of comparative tables and remarks a few only can be indicated.

In San Francisco the ascending aorta is rarely affected, in contrast to English experience (cf. statistics of Myers, *Lancet*, 1869), a peculiarity noticed by Soule. For nineteen years (1865-1884) the number of deaths from aortic aneurysm has remained in a general way constant; total 644, averaging nearly thirty-four yearly, whilst deaths from other circulatory diseases have increased nearly twice as fast as the population. The ratio of aneurysms in women to men was for eighteen years as 7.9 to 92.1.

Berlin in ten years did not show fifty fatal cases of aneurysms, while San Francisco, with one-fifth the population, has as many in one year. Hence, e. g., the Germans can not be assumed to bring any race predisposition with them. Again, while in Berlin the diseases of the circulatory system gradually increase in mortality statistics up to the seventh decade of life, in San Francisco they correspond to the aneurysms in frequency. Hence R. concludes that some forms of heart and circulatory diseases bear a close relation to the frequency of aneurysms.

Comparison with Cincinnati presents a very similar showing to that with Berlin.

He finds that those performing the severest bodily labor were one-fourth natives, three-fourths foreigners—the same relation as in the cases of aneurysms. Rheumatism and gout are largely blamed for the frequency of aneurysms in England, and both these troubles are frequent in San Francisco. Yet, from the fact that they are not as frequent causes of death, they do not appear to be very active causes of aneurysm.

He makes the following points:

1. Aneurysm of the aorta is a specific disease of the working class.
2. A workman runs in danger of acquiring an aortic aneurysm if he fills the conditions which produce endarteritis.

3. The chief causes of endarteritis are chronic alcoholism and continued excessive muscular exertion.

4. Endarteritis is probably, with rare exceptions, the primary cause of aortic aneurysm.

5. More aortic aneurysms appear in this country having a relatively larger number of fatal cases, of vascular disease.

6. Prophylaxis consists in an oversight of the course of life of those performing severe bodily labor.

7. Various nationalities, under the same conditions, are equally disposed to the acquisition of diseases of the circulatory system.

8. In respect to age, the number of deaths from vascular diseases runs nearly parallel to that from aneurysms, and is largest at the same decades of life.

9. The largest number of fatal cases from aneurysm in general as well as aortic aneurysm in particular is observed in the fifth decade of life, then in the fourth and sixth.

10. Of the four portions of the aorta the arcus shows the most aneurysms, next the descending aorta, then the abdominal, and finally the ascending.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. III.

HEAD AND NECK.

I. Phosphorus-Necrosis of the Jaws. By Dr. J. EWING MEARS. (Philadelphia.) A systematic consideration of the subject of the peculiar necrosis of the jaws to which operatives in match factories are subject, including successively the literature, etiology, pathology, symptomatology and treatment of the disease. The conclusions of the author are as follows:

1. The disease is a local expression of the constitutional condition produced by the inhalation of the vapor of phosphorus, and by particles of the agent taken into the system with the food by operatives in match factories who do not give proper attention to cleanliness of the hands.

2. The introduction of the agent into the system is, as a rule, very gradual, and in such small quantities as to avoid the production of symptoms of acute poisoning. In this way the chronic toxic condition of the system is induced, characterized chiefly by disintegration of the red blood-corpuscles and fatty degeneration of the arterial coats.

3. The toxic condition precedes the jaw disease, as is shown by the fact that the disease does not attack operatives recently exposed to the action of the agent, but those who have been exposed for a period of years.

4. Examination of the teeth of operatives has shown that many who have caries, and have returned to work immediately after the extraction of teeth, have enjoyed immunity from the disease, showing that the agent had not attacked the periosteal tissue thus exposed. This was further shown by the fact that in one case necrosis did not appear until three months after labor in the factory had ceased.

5. Individuals vary in their susceptibility to the action of the poison ; for this reason many suffer immediately with acute symptoms, such as nausea, vomiting, etc., and are compelled to abandon work in the factories.

6. The conditions under which experiments have been made on animals to prove the absence of the disease until exposure of the periosteum and perialveolar tissue was effected are not similar to those to which operatives in match factories are subjected.

7. Treatment of the disease in the primary stage is efficient and prevents its progress.

8. The antidotal powers of turpentine have been established.

9. The disease is to be prevented among operatives by the adoption of thorough methods of ventilation, stringent rules with regard to cleanliness, and the free disengagement of the vapor of turpentine in all the apartments of factories in which the fumes of phosphorus escape.—*Trans. Amer. Surg. Assoc.* Vol. III. 1885.

J. E. PILCHER, (U. S. Army).

II. On Dead Osteoma of the Nasal and Frontal Sinuses.

By Dr. H. TILLMANN. (Leipzig.) Besides a review of the subject, T. gives the following case: Woman æt. 53, who had long suffered from headache, especially in the region of her later trouble. For the last eight years a slowly increasing prominence in region of left frontal sinus. This had led to prominence and blindness of the left eye. A fistula had existed for six months on the edge of the left orbit. The nose had been almost occluded for years. The left bul-

bus was now immovable and the seat of panophthalmitis. A sound passed through the mentioned fistula touched dead bone. Polypous formations in the left nostril; right nostril filled by a bony concrement. The eye was first enucleated under the supposition that the frontal tumor had perforated the orbita; this had, however, not occurred. Two weeks later the frontal sinus was opened; it was the size of a goose egg, and contained two free osseous balls, one size of a pigeon's egg, the other of a small walnut. The site of a former pedicle was visible on each, as likewise the point of their original attachment, where the ethmoid bone joins the sinus wall. They had developed from the ethmoid. The sinus walls were much attenuated, but not perforated. Several bits of necrotic bone were removed and a free communication with the nose established. Six days later he slit up the right nostril to the root and removed the nasal osteoma. This had originated also from the ethmoid bone, and showed a former pedicle. Subsequent plastic operation for the frontal defect. Good result—the only disfigurement being the loss of the eye. The nasal osteoma weighed, when dried, 47.1 grms.; the frontal weighed 24.85 resp. 7.6 grms. T. inclines to the opinion that most at least of these growths have originally a bony pedicle.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. III.

III. On Resection of Goitre, with Remarks on the Conditions Consequent to Total Extirpation of the Thyroid Gland. By S. MIKULICZ (Cracow). The published cases of so-called cachexia strumapriya already number 35, to which M. adds another. But there are other evils which may result from total extirpation of the thyroid. Weiss, two years since, found thirteen cases of tetany, and M. has had four cases amongst seven operations. Wiebrect's statistics, however, showed but three deaths from tetany. Again, M. cites three cases—two of his own and one of Obalinski's—where epileptic convulsions followed. A fourth evil is paralysis of laryngeal muscles.¹

Hence M. has in eight cases in the last one and a half years practiced what he calls a resection of the goitre. He illustrates with a case. Young peasant æt. 16 years. Bad goitre. He had hoped to

Cf. Jankowski. *Annals.* 1885. Pec. P. 504.

spare the right lobe, but since it proved to be partly substernal, he concluded to remove by resection. The growth was first freed as far as possible with blunt instruments; ligature of superior thyroid artery and vein and of the superficial branches to the lower horn. The lobe was now cut with scissors from the ant. resp. lateral surface of trachea, care being taken not to reach the recurrent nerve. At length the goitre only hung from the angle between trachea and œsophagus, just over the recurrent nerve and thyroid artery. This remainder, the hilus of the gland, he treated as he would a short, thick ovarian pedicle. An assistant compressed the entering vessels; the pedicle was divided longitudinally into several parts, each of which was seized with hæmodynamic forceps and tied with catgut. It was then cut away, leaving stumps 5 to 10 ctm. long; scarcely any bleeding. The remainder of the gland contracted to about the size of a chestnut. Primary union. Discharged in ten days. Reports up to seven months after the operation show an entirely satisfactory result.

In five cases one lobe was extirpated, the other resected; in one both lobes were resected, and in two only the one goitrous lobe was resected. One was a case of Graves' disease; here rapid improvement followed. As yet he has observed no untoward consequences.—*Centbl. f. Chirurg.* 1885. No. 51. Dec. 19.

GENITO-URINARY ORGANS.

I. On Displacement of the Urinary Bladder by Tamponing the Rectum. By Dr. FEHLEISEN (Berlin). In 1878 Braune and Garson published the results of some experiments with this procedure—from frozen median sections. The former called attention especially to the effect on the urethra, the upward displacement of its inner orifice, etc.; the latter (*Edinbg. Med. Jnl.* for Oct., 1878) considered the like effect on the prævesical fold of the peritoneum. Petersen (1880) who has been given credit for this method, seems to have worked it out independently. Its principal application is in suprapubic lithotomy. Mannheim (1884), working under Bergmann, studied it on cadavers of children from 2 $\frac{1}{4}$ to 8 years old. F. was also instigated to his work by von Bergmann. He prepared frozen sections,

placed a glass plate on the flat surface and marked out the exact relations. Four large colored lithographs illustrate his results. In the first the rectum was empty, the bladder moderately filled—300 ccm. fluid. The bladder here has a spherical form; the internal urethral orifice is 1 ctm. above and 4 ctm. behind the lower border of the symphysis; the fundus of the bladder lies about horizontal about on a level with which is the lowest point of Douglas's pouch; the intestines are 4 ctm. above the upper symphysic border, while the prævesical peritoneal fold is but $1\frac{1}{2}$ ctm. above.

The second plate shows the displacement of the bladder on filling the rectum—the bladder containing 200 ccm. of fluid and the rectum a tampon of 480 ccm., formed by a rubber bag drawn over the end of a stomach tube and fastened some 8 to 10 ctm. from its tip. Such a tampon he finds better than a colpeurynter, both for experiment and practice. The bladder is now not round as in the former case, but in section approaches a pentagon whose base is the fundus, the other four limiting sides being the symphysis, anterior abdominal wall, small intestines and rectum. The fundus vesicæ slopes down anteriorly at about half a right angle. The internal urethral orifice stands 4 ctm. above, but scarcely 1 ctm. behind the lower symphysic border. The lower edge of the posterior peritoneal fold is about 5 ctm. above a horizontal, touching the lower border of the symphysis. In front the intestines and prævesical fold are 4 ctm. above the upper symphysic border. While in the first it would be impossible to tap the bladder without endangering the peritoneum, in this second there is ample room for a *sectio alta*.

To show how little the position of the peritoneum is affected by simple charging of the bladder he made a preparation where about as much fluid was injected into the bladder (630 ccm.) as in the last case into bladder and rectum together.

Again, the bladder is circular in section. The first fold of peritoneum is 2 ctm., the intestines $4\frac{1}{2}$ ctm. above the symphysis. The bladder has extended rather back and downwards than upwards. The internal urethral orifice is on a level with and $4\frac{1}{2}$ ctm. posterior to the lower edge of the symphysis. The prostatic portion of the urethra lies almost horizontal.

The next plate shows both bladder and rectum quite full, containing 420 resp. 500 ccm. Peritoneal fold and intestines are this time $8\frac{1}{2}$ ctm. above symphysis. The form of the bladder is very irregular; the internal urethral orifice lies scarcely 1 ctm. behind the symphysis and about $2\frac{1}{2}$ ctm. higher than its lower border. The posterior angle of the fundus and the lowest point of Douglas's pouch are on a level with the upper border of symphysis.

The bladder as well as rectum must be distended to a certain degree in order in a healthy adult to raise the anterior-peritoneal fold materially above the symphysis. Petersen found as an average of ten measurements that with bladder and rectum empty this peritoneal fold extended $2\frac{1}{2}$ to 3 ctm. below the crest of the symphysis; in only one case was it on a level with the crest; in ten cases he also found that an injection of 600 ccm. in the bladder raised the fold on an average but 1 ctm. above the crest. P. advised first injecting the bladder, then the rectum; F. reverses the order and recommends first filling the rectum with 450 to 500 ccm., then the bladder with 250 to 300 ccm., thus throwing the strain more on the rectum and elevating the fundus vesicæ better. A better result is secured with stout than with thin subjects.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. III.

II. Operative Treatment of Ectopia Vesicæ. By Prof. TRENDLENBURG. (Bonn.) Former methods are criticised. Thiersch's flap closure, e. g., does not secure use of the bladder musculature. T.'s first attempts to secure direct union of a vesical and urethral fissure by joining its lateral edges were begun five years ago. His plan is by dividing the sacro-iliac synchondrosis on each side to mobilize the iliac flanges and then by lateral pressure to approximate them in front. Finally, the fissure thus narrowed is, after reposition of the bladder, to be directly closed by freshening and suturing its edges. Inferiorly the union is to be continued at least to the beginning of the pars bulbosa urethræ. Division of the sacro-iliac symphysis is in children simple, and, when carefully done, not dangerous. The child is laid on its belly and a finger introduced into the rectum to determine the position of the incisura ischiadica major and superior gluteal artery. A long cut is then made over said symphysis; this is

gradually deepened until strong lateral pressure makes the pelvic flange yield. On account of the large pelvic vessels it is not permissible to cut through the deepest portion of the symphysis. Towards puberty and later in life this operation would have to be done with the chisel, and would be more serious. The construction of a continuously active compressing apparatus, that could be tolerated for weeks, proved difficult. Tourniquet arrangements were not borne. A girdle crossing in front, with extension weights of ten to fifteen pounds attached, has of late proven satisfactory. Where previously the spinæ sup. ant. were 17 ctm. apart, they approached to within $11\frac{1}{2}$ ctm. The two pubic symphysis stumps, formerly 5 ctm. apart, were now almost in contact. It is well to delay the operation for the fissure some six or eight weeks. This second operation begins with freshening the fissural borders; he then frees the edges of the bladder somewhat, and unites with Lembert's sutures. The urethra has usually been included in the operation. A catheter is left for a few days. In all cases as yet the union to the extent of urethra and bladder neck has subsequently separated. In a $2\frac{1}{2}$ year old boy the remainder of the bladder held and the prolapse was remedied. He thinks that by further perfecting his operation it may prove successful.—*Centbl. f. Chirg.* 1885 No. 49.

W. BROWNING (Brooklyn)

III. Operation for Congenital Extroversion of the Bladder of an Infant Five Days Old. By H. C. WYMAN, M.D. (Detroit, Mich.) From the umbilicus down to the triangular ligament there was a failure of development causing an extroversion of the posterior wall of the bladder, showing the orifices of the ureters and an absence of the dorsum of the penis. Dribbling of urine from the ureters was constant. Under chloroform incisions were made on either side through the integument and superficial fascia just forward of the anterior superior spine of the ilium two inches upward, to secure relaxation; the edges of the fissure were then pared and fastened together with harelip pins with intermediate sutures, and the wound dressed with oxide of zinc and absorbent cotton, a drainage-tube for the urine being left in the wound. The penis was not touched,

being reserved for a secondary operation. The recovery was rapid and perfect. The child died from convulsions two months later, before the operation upon the penis could be performed.—*N. Y. Med. Rec.* 1885. Dec. 12.

IV. Fixation of Floating Kidneys. BY L. H. DUNNING, M.D. (South Bend, Ind.) The writer concludes from observations upon recently killed animals, supported by one operation in the human body, that the kidney has a normal range of motion in its bed of peri-renal fat, and, considering that the operation for fixing a floating kidney should not interfere with this power, he disapproves of stitching the capsule to the adjacent structures or of any plan to secure its adhesion to the parietes, but recognizes that if the peri-renal fat and capsule are intact—retaining their intimate relation to each other and to the kidney—as may be ascertained when the viscus is exposed, suturing of the fatty envelope fulfills all indications, and is the method to be chosen. *Jour. Am. Med. Assn.* 1885. Dec. 19.

V. Case of Nephrectomy for Calculous Pyelitis. By F. J. SHEPHERD, M.D. (Montreal). The diagnosis of the case having been narrowed down to a question between tuberculous and calculous pyelitis in the case of a married woman, æt. 24, it was decided to make an exploratory lumbar incision, to be followed by nephrotomy or nephrectomy, as circumstances would demand. The kidney was exposed by an incision extending from the edge of the erector spinæ muscle downward and forward for nearly six inches, and found to contain a calculus and to have been converted into a large sacculated pus-containing bag, as large as a foetal head, with numerous outlying thin-walled cysts. The wound was enlarged by an incision at a right angle to the original one so that the hand could be introduced. In spite of some troublesome venous hæmorrhages and many adhesions, especially in the lower and posterior part, the kidney was enucleated without injury to the peritoneum or any other important structure, the large cavity caused by its removal being rapidly obliterated by the intestines pushing forward the peritoneum. The wound was irrigated with corrosive sublimate solution, closed, and dressed with iodoform and sublimated dressings, and the patient proceeded to an uninterrupted recovery.—*N. Y. Med. Rec.* 1885. Dec. 12.

VI. Case of Suprapubic Lithotomy—Suture of Bladder Wound—Primary Union. By L. S. PILCHER. (Brooklyn.) The operator presented at a meeting of the New York Surgical Society a patient upon whom, fourteen days before, he had operated for the removal of stone from the bladder by the suprapubic method. The patient had suffered from symptoms of stone about nine years. After etherization, a rubber ball having been introduced into the rectum, it was distended with about ten ounces of water, after which nine ounces of a warm solution of boracic acid were injected into the bladder through a soft rubber catheter. The result was to cause a very marked protuberance of the bladder above the pubis, and to make exposure of its antero-superior wall, by incision above the symphysis pubis, remarkably easy. The wall of the bladder having been exposed, he followed the suggestion of von Antal, of making an oblique incision through the muscular wall, so as to increase the width of the fresh surfaces afterward to be united by suture. Upon the incision into the bladder being completed, the stone was seized and removed without difficulty. It was of moderate size, weighing 207 grains in its dry state, and was composed of a nucleus of uric acid with an external layer of oxalate of lime principally, with some triple phosphates.

In this case, after removal of the stone, the ease with which the interior of the bladder could be inspected was particularly noteworthy. The posterior wall was clearly visible, and the whole anterior wall was easy of exploration.

The catheter, through which the preliminary injection of boracic acid solution had been made, was left *in situ* to insure continuous drainage of urine; the wound in the bladder was closed by seven or eight points of fine silk suture passing through only the muscular and submucous layers. The suprajacent musculo-tendinous layer was then closed by a running catgut suture; the subcutaneous tissue was then brought together and supported by three harelip pins, and finally a superficial line of sutures was placed through the integumental wound, a little cotton sprinkled with iodoform was laid upon the wound and the man was put to bed. Absolute well-doing attended the after-course of the case; the catheter was removed on the ninth day, and the pins upon the day following. On the eleventh day the man went

to his home, permanent primary union throughout the whole extent of the wound, without unpleasant symptoms of any kind having taken place.

VII. Lithotomy Twice Performed in Fourteen Months for Recurring Vesical Calculus. By R. HARRISON, F.R.C.S., (Liverpool). A calculus, chiefly phosphatic with a uric acid nucleus, weighing about three ounces, was removed piecemeal by lateral section with some difficulty, because of an enlarged prostate, and the patient was in due time able to return to his work although the wound did not close entirely. About fourteen months later another, a friable phosphatic stone, was discovered and removed by a repetition of the former operation. The writer believes that the nucleus of the stone, although of considerable size, failed to be discovered at the first operation, being concealed by a hypertrophied prostate. He considers this condition to be the most frequent cause of the reproduction of calculus, particularly in elderly persons who have been in the habit of voiding calculous matter for years and who cease to do so because of the obstruction exerted by the gland.—*Boston Med. and Surg. Jour.* 1885. Dec. 17.

VIII. Nephrolithotomy. By Dr. L. McLANE TIFFANY (Baltimore). Reports the case of a male, æt. 26, upon whom he performed an explorative nephrotomy, by the lumbar incision, Feb. 21, 1885; a stone having been detected by exploring the kidney with a needle, the kidney was freely opened lengthwise by the hot blade of Paquelin's cautery and the calculus exposed. This being firmly grasped by the kidney structure, was broken up and scraped away by a sharp spoon, and the debris washed away by means of a syringe. The collected fragments weighed 556 grains—phosphate of lime. Hæmorrhage was insignificant. Drainage. Iodoform dressings. Rapid convalescence. Discharged from the hospital during fourth week. Healing perfect. The author also discusses those cases in which symptoms exist similar to those attending the presence of kidney stones, but in which no stone is found upon incision and exploration of the kidney, though the operation is followed by relief to the pre-existing symptoms. He believes the relief in these instances to be due to free division of

the kidney capsule, and the case is comparable to that of the relief brought to an inflamed testicle by division of its fibrous capsule.—*Trans. Amer. Surg. Assoc.* Vol. III. 1885.

IX. Some Points in the Surgery of the Hypertrophied Prostate. By Dr. J. W. S. GOULEY (New York). Pays a tribute to the late Dr. Mercier (Paris), to whose researches he believes there is little to be added, and that only by way of detail. Gives hints as to best methods of physical exploration, advising in many cases the use of certain rectangular metallic catheters and sounds, one form of which, resembling a modified lithotrite, he described under the name of a "cysto-pylometer." Describes methods and indications for catheterism and vesical injections and irrigations, and finally treats of the operations of *prostatotomy* and *prostatectomy*. These operations, he believed, should be reserved for cases of crescentic valvular obstructions, and bars of not more than a centimetre in thickness. He advises external *prostatotomy* by preference. For large sessile supra-montanal growths, he advises very free central incision. He claims priority in the actual performance of the operation of external *prostatotomy* or *prostatectomy*.—*Trans. Amer. Surg. Assoc.* Vol. III. 1885.

BONES, JOINTS, ORTHOPÆDIC.

I. Coincident Fracture and Dislocation of the Sternum by Indirect Force. By J. P. TUTTLE, M.D., (New York). A man while diving struck head foremost upon the sandy bottom and upon examination was found to have sustained a dislocation of the manubrium upon the gladiolus and a fracture of the latter about an inch and three-quarters lower. The deformity was overcome by placing the patient on his back with a pillow under his shoulders and his head and pelvis resting upon a lower plane. Recovery was complete with but little deformity in four weeks. There was no lesion of any other part, to which unusual fact the recovery of the patient was doubtless due. Although the patient believes that he struck upon his head, the writer doubts it, because of the absence of cerebral and spinal lesions, and considers it more probable that he struck upon his extended hands and that the violence was transmitted through the upper extremities and first ribs to the sternum.—*N. Y. Med. Rec.* 1885. Dec. 19.

II. Fracture of the Coracoid Process. By J. W. BYERS, M.D., (Charlotte, N. C.). A review of the literature of the subject reveals a total of but few reported cases, most of which are here cursorily referred to. The case forming the *raison d'être* of this paper occurred in a thin man whose right forearm had recently been amputated a few inches below the elbow. While endeavoring to avoid a passing vehicle, he fell with the stump raised above his head and thrown outward, receiving the violence of the fall on the space corresponding to the deltoid insertion of the humerus and the outer aspect of the shoulder joint. There was no apparent deformity but movement of the stump revealed crepitus, which was readily referred to the coracoid process. The power of shrugging the shoulder was lost, due to the loss of the co-operation of the coraco-brachialis and pectoralis minor muscles—a valuable point in the diagnosis. The fracture was doubtless caused by the head of the humerus being driven violently against the process. The coraco-acromial ligament was thought to have been ruptured, although the coraco-humeral ligament was intact, to which fact the writer attributes the apparent reduction of the fracture produced by outward rotation of the arm. Ligamentous union only—as is almost invariably the result in these cases—was obtained by immobilizing the arm flexed across the breast so as to relax the muscles attached to the process, a position which seemed to secure the least discomfort to the patient. The natural use of the limb was still much impaired a year later.—*Pamphlet*. 1885.

III. The Treatment of Fractures of the Upper Extremities. By S. W. SMITH, M.D. (New York). This is a study based upon 100 cases of fracture of the upper extremity, excluding the hand, the majority affecting the clavicle (37) and the radius (34). The former he treats with a "scarf-splint," consisting of a "padded gauntlet-shaped piece of leather, laced to fit the forearm, running on either side back of the bend of the elbow; to this part is attached a strap and buckle; a padded collar with strap, buckle and ring, is fitted to the uninjured shoulder; through this ring the strap from the elbow piece passes, and, by tightly drawing this strap, the arm of the injured shoulder is under sufficient control to bring the fragments into perfect

apposition; a sling passes from the ring of the collar on the uninjured side of the neck, for the hand of the injured side." This splint is claimed to meet the indications for throwing the shoulder upward and backward and overcoming all muscular action, without any of the drawbacks attendant upon other methods. His cases of fracture of the radius mostly affected the lower end. He proposes to continue the awkward practice of attaching Colles' name to fractures at this point, but refers the name to the oblique variety only, excluding the transverse or short oblique. In common with the vast army of surgeons who have preceded him, he has invented a splint for the treatment of these fractures, in spite of the fact that they are usually best treated without any splint at all, provided the displacement has once been properly overcome. He refers to Moore's method of treatment with a band of adhesive plaster drawn tightly about the wrist, over a roller bandage, as a compress under the ulna, with disapproval, but fails to mention the method of L. S. Pilcher, an improvement upon Moore's method, and much superior to any splint in ordinary cases—consisting of a strip of adhesive plaster about an inch in breadth, drawn tightly about the wrist at the point of fracture, and covered by a bandage closely encircling the hand, wrist and part of the forearm. By this method alone can the early and frequent motion, which he urges, be satisfactorily obtained.—*N. Y. Med. Rec.* 1885. Dec. 19.

IV. Treatment of Joint Diseases by Rest and Fixation.

By DE F. WILLARD, M.D. (Philadelphia.) The writer believes that the application of rest in the treatment of joint diseases should be raised from a secondary to the leading position, and all other methods rendered subsidiary to it, since it subdues joint inflammation more effectually than all other means combined, often aborting, always diminishing an impending process. The more perfect the rest the greater the diminution of pressure, friction, tension and inflammation, and the less resultant ankylosis and suppuration. Counter-irritation is of but secondary importance. In inflammation of the sterno-clavicular, acromio-clavicular and scapulo-humeral articulations, the arm should be fastened to the body, which takes the place of a splint. In elbow disease the member should be fixed in a semi-flexed or extended position;

pressure, aspiration, puncture, drainage, excision, etc., to be used as necessary. In the wrist and hand articulations the same principle is to be enforced. Early exit of pus must be secured antiseptically by the bistoury and the progress of caries carefully watched, the surgeon interfering only when nature is unable properly to accomplish separation or health fails. In the ankle and foot the same principle holds, fixation by plaster or other rigid material being complete and permanent, and locomotion being absolutely forbidden—a rule useful also in the knee and hip. At the knee the question of counter-irritation, immobilization or rest in bed with extension, will depend largely upon the amount of traumatism and the existence of muscular rigidity. When nature indicates by the last mentioned symptom that motion is harmful, delay in enforcing one of the latter measures is criminally negligent. Serious effusion should be aspirated, pus evacuated antiseptically, free drainage maintained and excision practiced as soon as it is decided that destruction has occurred. Permanent rest and fixation with the use of crutches are far better than any form of extension that can be applied in the upright position. In hip disease horizontal extension with fixation answers best in the acute stage. Three months after the cessation of pain, if deformity has been largely reduced, the erect position may be assumed, provided the joint is put at rest by a fixation apparatus and a high shoe and crutches are used.—*N. Y. Med. Jour.* 1885. Dec. 5.

J. E. PILCHER, (U. S. Army).

V. On the Question of Operation in Tuberculosis of the Knee-Joint in Children. By Dr. W. MUELLER. (Göttingen). The later results of the operation, described by Volckmann last year (*V. Annals*, vol. I, p. 486) as arthrectomy, and practiced in König's clinic since 1881, are here presented, in view of Volckmann's statement of his very favorable results. These represent twenty-three cases of M.'s chef, König. One died from iodoform intoxication, one from chloroform, probably, and two later from tuberculosis—in one of which the knee had remained fistulous—leaving nineteen living and available for the present purpose.

The five operated within a year have remained without any fistula, although one has developed a coxitis and another a vertebral affection.

Fifteen of the whole nineteen were cured locally, the latest four months since, the earliest four years. In five of these fifteen subsequent minor operations—curetting, etc.—have been necessary. Of the other four, two are said to still preserve slightly secreting fistulæ, while two are reported entirely well.

Of eight cases of synovial tuberculosis but one—with large abscesses—failed to give primary. In eight cases with coexistent osseous foci, there were four rapid and four slow cures, besides two others reported cured by parents.

As to the functional result a complete answer can hardly be given until the children have completed their growth. In six only—all of which had osseous foci—of the nineteen, did a firm anchylosis result. In none of the cases examined was there any demonstrable retardation in growth. Despite prolonged immobilization of the joint, some slight motion remained, more frequently when the cure was rapid; in two considerable active extension and flexion was possible. When supports are not worn they show a great tendency to contracture in flexion, just as after resection.—*Centbl. f. Chirg.* 1885. No. 50.

W. BROWNING (Brooklyn).

GYNÆCOLOGICAL.

I. Kolpohysterectomy for Cancer. By S. E. POST, M.D., (New York). This paper is a compilation of the literature of the operation, with tables, constituting a comparison of its results, and concluding that: "1. The results of the operation have progressively improved with the increased number of operations. 2. The total number of operations reported is approximately 341, with a total mortality of 27 per cent; 222 cases were treated with the open peritoneal wound, with a mortality of 22 per cent; of that number the supravaginal wound was covered by peritoneum, with a mortality of 18 per cent; and of the ninety-three, fifty were operated upon during the preceding three years, with a mortality of 10 per cent. 3. Of ninety-seven cases which survived operations done previous to 1883, 18 or 20 per cent are known to have been well at the end of eighteen months or two years. 4. The latest results of kolpohysterectomy for cancer contrast not unfavorably with those of the total extirpation of other or-

gans for malignant disease. 5. The tendency of medical literature is to regard kolpohysterectomy for cancer as a legitimate operation, subject only to the restrictions common to other extirpations for malignant disease."—*Am. Jour. Med. Sci.* 1886. Jan.

II. Case of Cæsarean Section. By R. ABERDEIN, M.D., (Syracuse, N. Y.). In the case of a primipara, æt. 29, the completion of labor was found to be rendered impossible by an oval pedunculated intra-uterine tumor (myoma?) six inches long by four thick. Cæsarean section was performed and a healthy child removed through the abdominal incision, but the tumor was left *in situ* and the wound closed antiseptically. The patient rallied well and appeared to be in a fair way to recovery, but suddenly died on the following day from the shock due to the injudicious action of a neighbor, who gave her a detailed account of the operation. It is difficult to understand why the possibility of a recurrence of the trouble in this case was not obviated by the removal of the tumor or by double oöphorectomy.—*N. Y. Med. Jour.* 1885. Dec. 19.

II. Vulvar and Vaginal Enterocoele. By T. GAILLARD THOMAS, M.D., (New York), Recognizing five varieties of hernia which may appear in the vagina or vulva—(1) cystocoele or hernia of the bladder, (2) rectocoele, or hernia of the anterior wall of the rectum, (3) vaginal enterocoele or descent of a portion of the small intestines into the vagina, (4) pudendal enterocoele, pudendal hernia, or descent of the small intestines into the labium majus of one or both sides, (5) Perineal enterocoele, perineal hernia, or descent of the small intestines by protrusion through the perineum—he discusses only the last three.

Vaginal enterocoele.—is formed by a loop of small intestine pushing the peritoneal lining of the sac of Douglas down, and, infringing upon the vaginal wall, causing it to arch inward until there is formed an intra-vaginal tumor, which sometimes protrudes through the *ostium vaginae*. The walls of the sac then consist of peritoneum and the inverted vaginal wall. The symptoms apt to develop are: Difficult locomotion, pelvic tenesmus, colicky pains, tendency to constipation and, in time, vomiting; with parturition, liability to obstruct labor is added. A tumor of variable size is found in the vagina; it is soft, supple and

yielding, decreases upon pressure, gives a sense of gurgling to the finger if not to the ear, increases upon the patient's coughing or straining, yields resonance upon percussion and is very generally reducible if the patient be placed in the knee-chest position and efficient taxis be practiced. It should be differentiated from prolapsus of the vagina, uterus, bladder or rectum or a combination of these displacements; from vaginal, parovarian or ovarian cyst; from a fibrous tumor low down in the pelvis, a cold abscess of the pelvis or a marked case of tubal dropsy. Two cases of acute vaginal hernia consequent upon traumatism are related and care in manipulating the wall of the vagina inculcated. Vaginal hernia, so long as it remains in the pelvic cavity, is a matter of little moment, since, because of the absence of a neck, it is not prone to strangulation, although it may occur from pressure of the foetal head, inflammatory processes, faecal impaction, torsion of the contents of the sac or the existence of a neoplasm.

Pudendal enterocele appears as an elastic tumor about the size of a pigeon's egg, near the middle of the labium majus of one side, and may be formed (1) by the intestines following the course of the round ligament through the inguinal rings and (2) by passing downward between the vagina and the ramus ischii, reaching the labium from within the pelvis; at the beginning, the latter variety exactly resembles vaginal hernia, but instead of inverting the vagina before, it separates the vaginal wall from the ischium and insinuates itself between these parts. The two varieties of pudendal hernia may be differentiated by the fact that in the second, the finger will pass into the pelvic cavity between the ischium and vagina, when pushing the tumor upward, entering the pelvic roof at the level of the os uteri or thereabouts, and the tumor will reappear on coughing, in spite of pressure on the inguinal canal. Diagnosis should be made from cyst or abscess of the vulvo-vaginal gland, cyst of the labium majus or minus, and abscess of the former, fatty or fibrous tumors of the labium and tumors descending from the pelvic cavity. He considers almost pathognomonic of this condition: (1) airy feeling on palpation, (2) gurgling on replacement, (3) diminished tension in the dorsal decubitus, (4) diminution of bulk upon taxis, (5) resonance upon percussion, (6) succussion upon coughing and (7) intestinal pains of a colicky character.

Perineal enterocele in the female consists of the descent of the intestine between the vagina and rectum, posterior to the broad ligament and continuing until the perineal muscles are forced apart and the gut, with its peritoneal envelope, is arrested by the skin. He quotes Astley Cooper's statement that, having reached this point, it does not project as an external tumor, and can be felt in the male from the rectum and in the female from the rectum and vagina.

All these varieties of hernia are readily amenable to taxis, which is greatly facilitated by the genu-pectoral position. In case of strangulation, the surgical practice usual in hernia is indicated. The necessity for this, however, is rare, the greatest danger being attached to errors of diagnosis, by reason of which the tumor may be subjected to operation as a cyst, polypus or fibroid, or an abscess, a number of cases of which are quoted. But one variety, the pudendal, originating from the inguinal canal, can be helped much, and the others can be relieved but slightly by pessaries, pads and other mechanical devices. A case is related of a large vaginal hernia—containing a soft shapeless tumor, probably a local hypertrophy of the pelvic connective tissue in addition to the intestine—in which the author performed laparotomy, emptied and inverted the sac, and, dragging it up, fastened it in the abdominal wound. The patient made a good recovery and, although apprehensive about her future, the author would be inclined to repeat the procedure in a similar case.—*N. Y. Med. Jour.* 1885. Dec. 26.

J. E. PILCHER (U. S. Army.)

REVIEWS OF BOOKS.

TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIATION. Volume III. Edited by J. EWING MEARS, M.D., Recorder of the Association. Philadelphia; P. Blakiston, Son & Co. 1885. Large 8vo., pp. 396.

This elegant volume contains the work of the meeting of the association held in Washington, D. C., in April, 1885. The papers are not as numerous as in the preceding volume, but the elaborate and exhaustive character of some of them give to this volume a special value. The paper of Dr. Roberts, on The Operative Surgery of the Brain, and that of Dr. N. Senn, on Air-Embolism, have already appeared in the pages of the ANNALS OF SURGERY. The elaborate statistical study of nephrectomy, by Prof. S. W. Gross, has also been given to the readers of this journal in abstract from the full text which was published in the Am. Journ. Med. Sciences. A paper by Prof. P. S. Conner, on The Etiology of Traumatic Tetanus, elicited much discussion in the way of the relation of clinical observations, none of which, however, threw any light on the vexed question of the cause of tetanus, nor added anything to therapeutic knowledge. The papers by Prof. Tiffany, on Nephrolithotomy, of Dr. Gouley, on the Surgery of the Hypertrophied Prostate, and of Dr. Mears, on Phosphorus Necrosis of the Jaws, will be found, in abstract, in the Index of Surgical Progress department of the present number of the ANNALS. The volume concludes with a description by Dr. Prince of a device for securing purity of the atmosphere in an operating room. It consists, essentially, in arrangements by which the air is passed through a series of compartments, where it is subjected to the action of sprays and artificial showers, before it is admitted into the room. It is fortunate that practically it has been demonstrated that the asepticity of wounds can be secured by much less complicated methods than those here described.

This volume, as a whole, in the permanent value of its contents, excels its predecessors. Its examination must inspire in every reader a sincere respect for the association whose work it represents.

L. S. PILCHER.

BLÜTUNG, BLUTSTILLUNG, TRANFUSION NEBST LUFTEINTRITT UND INFUSION. Bearbeitet von Dr. W. HEINEKE, Professor der Chirurgie zu Erlangen. Mit 14 in den Text gedruckten Holzschnitten. Stuttgart: Verlag von Ferdinand Enke. 1885. Pp. XXXV-158.

This volume (No. 18 of the "Deutsche Chirurgie") although it deals with rather a limited range of subjects, is inferior in evidences of careful preparation to few of the series which have preceded it.

An extensive bibliography precedes the introductory section. The work is divided into three parts, the first of which, including upwards of sixty pages, treats of hæmorrhage, the second (pages 68 to 129), of its treatment, and the last of transfusion; these are further divided and subdivided with scientific precision. Hæmorrhage is defined in the introductory sentence as "the escape of blood from the vessels;" which always implies a solution of continuity of the vessels. Enlarging on this theme, the author proceeds to discuss the different forms of hæmorrhage, and the subsequent changes undergone by the escaped blood. The various causes of traumatic and spontaneous hæmorrhage are mentioned in the succeeding section, including direct injury to the vessels, degeneration of their walls, localized disturbances of the circulation and finally general diseases. Equally exhaustive is the next section on the sources of hæmorrhage. The reader will find here many curious and interesting facts, which have been culled from many different sources and skilfully blended into an harmonious whole. Every possible variety of lesion in arteries, veins, capillaries or lymphatics, whether produced experimentally in animals or accidentally in man, is described. Only three pages are given to the symptoms and diagnosis of hæmorrhage, but these cover the whole ground.

The paragraph on spontaneous internal hæmorrhage is rather vague and unsatisfactory, but that is true of the subject itself. Section 5, on the sequelæ, is exhaustive. Loss of blood may be fatal at once, it may cease, to return at intervals until it stops entirely or the patient succumbs, or it may cease spontaneously after a short time. Death from bleeding, we are told, is due essentially to the stopping of the circulation, which is caused, not so much by the weakened heart-beats, as it is by the lowering of the arterial tension, which prevents the filling of the veins. This assertion he defends at length, quoting the results of experiments on animals. A loss of about 3,200 gms. of blood will result fatally to an adult. The local and general phenomena observed after successive hæmorrhages are next referred to, the chemical and microscopical changes in the blood being stated at length. In treating of the spontaneous cessation of bleeding, the subject of physiological coagulation receives careful consideration.

Section 6, on the repair of wounded vessels, and the after-history of the extravasated blood is one of the longest and best in the book, containing three excellent original drawings (pages 50 and 51). Dr. Heineke enters thoroughly into the subject, quoting freely from the latest authorities. The "fate of extravasations," as he expresses it, forms the greater part of the section, and is described in a manner which recalls Professor Billroth's popular lectures upon the same theme with the difference that the present treatise is intended for more advanced students. A short section (which seems out of place here) on the entrance of air into the veins concludes the first chapter. The fatal issue of this accident is ascribed to "anæmia of the brain, spinal cord and heart, as well as a general deficiency of oxygen"—rather a complicated explanation it would seem.

We naturally expect to find a writer on surgery most at home in that part of his work which bears upon the actual practice of his art, rather than its theories. This expectation is not entirely fulfilled in the present volume. The author begins the chapter on treatment by dividing the agents used in controlling hæmorrhage into two general classes, the direct and the indirect. Under the first class he includes "such means as act by lowering the blood pressure, or at least by preventing its elevation." Venesection, rest, elevation of the part and cardiac sedatives are severally discussed. To the second group belong the local agents, such as cold, heat, ergot, and the so-called styptics. Hot water should be preferred to cold, since it is not only more efficient in arresting hæmorrhage, but acts as a decided stimulant, where cold tends to increase the condition of collapse which is already present. The author looks with true surgical contempt upon the employment of ergot to arrest hæmorrhage, the source of which can be reached more directly. He prefers the sesquichloride of iron as a styptic, but only uses it under protest. The use of the actual cautery is described, its scope being regarded as limited. Its true function is to stop capillary, or parenchymatous, bleeding.

The most important local agent is compression, which, according to one author, may be applied indirectly or directly. The subject of digital compression, of tourniquets and the rubber bandage is entered into at length. Acupressure, torsion, direct and indirect ligature are duly described, and a few pages are devoted to the matter of collateral circulation. An interesting historical sketch is followed by a short section on the proper application of the different agents described in the preceding pages. The suggestions are sensible and to the point. There are some valuable notes as to the best means of compressing bleeding vessels within the cranium and abdominal cavity. The

writer's teaching may be summarized in a few words—always look for the source of the hæmorrhage, and tie the bleeding point in the wound if possible.

Under the heading "Prophylaxis of Hæmorrhage," its prevention during surgical operations is meant. To this end the surgeon should (1) adopt bloodless methods of operating; (2) control the arteries; (3) empty the part of blood as far as possible. The first is sometimes impossible, but may be in part effected by care in making the incision and the employment of the *écraseur* and galvano-cautery. Local anæmia of a limb may be secured by the *tourinquet* or by Esmarch's bandage. Particular stress is laid upon the fact that most of the accidents (paralysis, gangrene, etc.,) which have followed so-called "bloodless" operations have resulted from too great and prolonged compression of the part. "In order to perfectly compress the vessels," it is stated, "it is not necessary to apply the firmest pressure that can be obtained with an elastic bandage." Moreover, the constriction should not last *more than an hour*. The writer proves by quotations from Ranke and Bruns that the fear of increasing the general arterial tension to an injurious extent by forcing the blood out of the extremities is groundless.

The section on "Treatment of the Results of Hæmorrhages" is short and unsatisfactory. As regards extravasations, we read that "in every case massage occupies the foremost place among the means that have been recommended for hastening the absorption of sanguineous effusions. Early puncture is advised in all cases of extensive hæmorrhages into synovial pouches. All readers will not be disposed to accept this teaching without reservations.

Chapter III. takes up the subject of "On Transfusion and Infusion." The indication for transfusion is "collapse, due to a sudden and profuse loss of blood." But since, as has been proved by Goltz and other experimenters, the phenomena observed after severe hæmorrhages are due to "emptying of the vascular pump" (*Leergehen des Gefässpumpwerkes*); this deficiency can be supplied just as well by a solution of salt, as by defibrinated blood. This use of salt-solution is called, by way of distinction, "infusion." A 0.7 per cent solution, without the addition of an alkali, is recommended, the amount infused varying from 500 to 1,000 grammes. In spite of the brilliant results that have followed the use of this simple injection, the writer agrees with the assertions of Landois and Maydl that in extreme cases its effects do not always equal those obtained by the transfusion of blood. Another valuable use of transfusion is in cases of poisoning from carbonic acid gas, chloral, chloroform and ether, phosphorus and

opium; also in uræmia, asphyxia, and even in the treatment of severe burns. Salt solution can not be depended upon in these cases. Dr. Heineke is opposed to the employment of transfusion in septic conditions, since he rightly believes that we thus only add fuel to the fire. Chronic anæmia and inanition are better treated by medication and proper nourishment. In conclusion the author states that there are really only two conditions in which transfusion is directly indicated—profound exhaustion after hæmorrhage, and urgent symptoms of poisoning. On the whole this chapter is a disappointing one. We should have expected from a practical surgeon less theory, and more details, especially concerning the injection of salt solution, with the technique of which every surgeon ought to be familiar at the present day, since he is liable to be called upon to perform the operation at a moment's notice, and with the crudest instruments. The author had it in his power to make this the freshest and most interesting chapter in the book, but he has chosen to devote most of his space to the consideration of technical details with which every reader is familiar. Yet this monograph contains no small amount of information, which could otherwise be obtained only by a wearisome search through a voluminous bibliography. The book bears every evidence of careful research and judicious condensation. That it is uneven is perhaps due to the wide field which the author was obliged to cover. The author's style is clear, and the work is, in the main, free from long-involved sentences. The absence of an index detracts not a little from the usefulness of the book.

H. C. COE.

DIE NEUBILDUNGEN DES UTERUS. Von Dr. A. GUSSEROW, O.O. Professor der Geburtshülfe und Gynäkologie in Berlin. Mit 51 in den Text gedruckten Holzschnitten. Pp. VII-262.

DIE KRANKHEITEN DER OVARIEN. Von Dr. ROBERT OLSHAUSEN, O.O. Professor der Gynäkologie, Director der Universitäts Frauenklinik in Halle. Mit 36 in den Text gedruckten Holzschnitten. Pp. XXXVIII-469.

DIE KRANKHEITEN DER TUBEN, DER LIGAMENTE, DES BECKENPERITONEUM UND DES BECKENHINDEGEWEBES, EINSCHLIESSLICH DER EXTRAUTERIN-SCHWANGERSCHAFT. Von Dr. L. BANDL, A.O. Professor der Geburtshülfe und Gynäkologie in Wien. Mit 32 in den Text gedruckten Holzschnitten. Pp. XX-232. Stuttgart: Verlag von Ferdinand Enke. 1886.

The almost simultaneous appearance of these excellent monographs (numbers 57, 58 and 59 of the "Deutsche Chirurgie,") justifies us in

considering them together. These works may be considered as revisions of similar ones which appeared in the "*Handbuch der Frauenkrankheiten*."

Dr. Gusserow's work has been introduced to the English reader in his own tongue, so that it will require but a brief notice. Over one-half of the monograph is devoted to fibromata, which, it is safe to say, have never been so thoroughly discussed elsewhere. Material alterations will be noticed in many places, ten additional pages having been interpolated. Most of the old illustrations have been retained and some new ones added, mostly drawings from microscopical preparations. (Comp. figs. 20, 21 and 22). Omitting special reference to each of the remaining divisions of the work, it may be said of the book, as a whole, that it is rather uneven in character. This is doubtless its greatest fault. Many sections which one would expect to find exhaustive are too brief, and matter that could have been spared with benefit to the reader is still retained. The paucity of its recent bibliography is more noticeable, because this fault cannot be imputed to any other work in the series.

Dr. Olshausen's work has long borne such an enviable reputation as a scientific treatise on diseases of the ovaries that the present edition does not require a minute examination. Thirty-eight pages of bibliography precede the first chapter, an array of authorities which attests the thorough manner in which the author has treated his theme. In glancing at the text we do not remark so much the addition of new matter as the thorough revision of the old. It is curious to remark the incompleteness of statistics that have evidently been compiled with great care. The author's own list of cases (293, with a mortality of 9.1%) is about the only one that is carried up to date. The pathology of the subject is handled in such a manner as to win our warmest approval. The differential diagnosis is exhaustive. Nearly 200 pages are devoted to the treatment of ovarian cysts, the operation of ovariectomy and its possible complications receiving the most careful attention. All the possible affections of the ovary are described at length. Chapter XVIII deals with the subject of oöphorectomy and the different indications for the operation. In discussing the conditions known as chronic oöphoritis and perioöphoritis, which he regards as indications for the removal of the ovaries, we are confronted by the following italicized sentence, which the thoughtful reader will scarcely approve: "There are unquestionably changes in the ovary almost invisible, and clinically of a sort not at all recognizable, which, nevertheless, may produce severe and permanent pathological phenomena, so that castration may even be beneficial, and may be indicated in cases

in which anatomical changes are not demonstrable" (p. 451, at bottom). Whatever may be a surgeon's acumen, or however great his success as an operator, such doctrine as this must be characterized as both unscientific and inhumane. We should be sorry to see our future gynecologists carried away by any such "brilliant (?) surgery" as this, even though it be championed by such an acknowledged authority as Dr. Olshausen. If a woman's ovaries are to be removed on suspicion, the Malthusian idea will cease to be an ideal one. With the exception of a few touches of this ultra-enthusiasm we regard this monograph as one without an equal. It differs from other works on the ovaries just as a scientific treatise differs from a popular text-book. We do not regard the omission of the indices from this and from the other two volumes as in any sense an improvement upon the former editions. In such an exhaustive volume as the one just considered an index is a necessity and its absence a positive blemish in an otherwise perfect book.

In turning to Bandl's work on the uterine appendages we expect to note the influence of the recent ideas popularized in this country by Mr. Tait. The presence of several new drawings will first be noted. Most of these (which are excellent) will be found in the chapter on extra-uterine pregnancy. It will next be remarked that the diagnosis, complications and treatment of pyosalpinx have not been materially improved. The reader will look in vain for that reference to Mr. Tait's writings which he certainly deserves; he will seek for a satisfactory statement of the difficulties of differential diagnosis and the methods of overcoming them. The operation of salpingotomy is dismissed with a few words, as if it was the easiest and the most simple problem presented to the laparotomist. An intelligent description of the best method of loosening and removing a purulent tube, when buried in a mass of adhesions, has not been presented to the profession.

The chapter on extra-uterine pregnancy is thorough. In paragraph 55 (page 87) we read that the foetus may be killed by electricity, but strangely enough no reference is made either to the *technique* of the operation or to the actual results, the writer making the confession (which is unusually humble for a German) that his countrymen have had no experience with this method of treatment.

It is unnecessary to examine at length the chapters upon pelvic peritonitis and parametritis. The pathology of the subject is treated at length. No less than thirty pages are given to the subject of adhesions following pelvic inflammation (chapter V.), the subject matter being exceedingly well arranged. Chapter VI., on hæmatocele, is ex-

haustive. The concluding chapter deals briefly with new growths of the broad ligaments and pelvic connective tissue.

We have no hesitation in assigning these three monographs to a prominent place in the library of the specialist. He will frequently have occasion to refer to them as to ultimate authorities. Their scholarship is of a high order, while the copious references and foot-notes with which they are filled will render them invaluable to any one who desires to work up the special subjects of which they treat.

H. C. COE.

RUPTURE OF THE LIGAMENTUM PATELLÆ, AND ITS TREATMENT BY OPERATION.¹

By HENRY B. SANDS, M.D.,

OF NEW YORK,

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SURGEONS; SURGEON TO THE ROOSEVELT HOSPITAL.

THREE forms of injury to the knee are closely allied by their causes, effects and principles of treatment. These injuries are, simple transverse fracture of the patella, subcutaneous rupture of the tendon of the quadriceps extensor muscle above that bone, and a corresponding lesion of the inferior division of the tendon, known as the ligamentum patellæ. The experience I have gained in the management of two cases of the last-named accident which have fallen under my observation, has led me to a brief study of its literature, from which I have gleaned a few facts of sufficient interest, perhaps, to justify me in bringing the matter to the notice of the Society. At the same time I desire to put on record a number of cases of this injury hitherto unpublished, and to describe an operation for uniting the ends of the divided ligament by suture, which I have performed upon the patient now exhibited before you.

Compared with the fracture of the patella, rupture of the ligamentum patellæ is a rare event. Maydl,² whose statistics are the largest I have yet met with, was able to collect only sixty-five examples of the latter form of injury. In this paper I am able to report thirteen other cases treated in the Bellevue, New York, St. Luke's and Roosevelt Hospitals. In order to form a rough estimate of the comparative frequency of the two forms of injury, I have caused a search to be made of the entire records of the four hospitals above mentioned, and have obtained the following result:

¹ Read before the New York Surgical Society, Dec. 8, 1885.

² Zeitschrift für Chirurgie, vols. xvii and xviii, 1882 and 1873.

	<i>Fracture of patella.</i>	<i>Rupture of ligamentum patellæ.</i>
New York Hospital	150 cases.	3 cases.
Bellevue Hospital.	140 "	7 "
Roosevelt Hospital	44 "	2 "
St. Luke's Hospital	19 "	1 "
Total	353 cases.	13 cases.

A comparison of these figures gives a ratio of about twenty-five to one.

The relative infrequency of rupture of the patellar tendon may be ascribed chiefly to its great strength and thickness, its relatively slight exposure to direct injury, and to the great mechanical advantage with which indirect violence often acts in causing fracture of the patella. Thus, as has been remarked, when the knee is bent and a sudden and powerful contraction takes place of the quadriceps extensor muscle, as in endeavoring to prevent the body from falling backward, the patella is acted upon by two forces, which, as its upper and lower borders are then free from contact with the femur, may cause it to break, in the same manner as a stick may be broken by bending it across the knee.

The remarks which I wish to make may conveniently take the form of a commentary upon the cases which have come under my care, or which, as may be seen in the appended table, have been gathered from the hospital records above mentioned. I shall give only my own cases in detail.

CASE I. Patrick F., a car driver, æt. 35, was admitted to my department of the Roosevelt Hospital, October 19, 1882. Ten years previously his right patella had been fractured by striking his knee against the pole of a truck. Five months later the same accident recurred, the final result being a fibrous union between the fragments, which remained separated a distance of two inches. On the day of his admission into the hospital, while in the act of hitching his horses to a street car, he missed his footing in attempting to ascend the plat-

form and felt something suddenly give way. An examination detected evidence of an old fracture of the right patella, which had been broken about its middle. The distance between the fragments measured two inches, and the interval was occupied by a broad, thick, fibrous band. In the normal situation of the ligamentum patellæ was found a shallow depression, dependent upon a complete rupture of the ligament, which seemed to have been torn close to its inferior extremity. Patient entirely unable to extend the leg. Much tenderness and swelling of knee.

Treatment.—Extension of limb to horizontal position. Ice bag applied to knee.

Oct. 28.—Pain and swelling subsided; vertical suspension of injured limb; rubber bandage to knee.

Nov. 14.—Apparatus removed; limb kept extended and raised on a pillow. The gap below the patella has filled up.

Dec. 3.—Waterglass bandage applied from ankle to thigh. Patient allowed to walk.

7th.—Discharged from hospital, wearing splint.

Nov. 21, 1885.—Patient reëxamined three years after injury. He states that, disobeying the instructions he had received on quitting the hospital, he removed the splint a few days afterward, and began to use the limb more freely. His knee remained stiff, however, until five weeks later, when, in descending a staircase, and being within two steps of the bottom, he imagined he had reached the end; and, putting forward his left foot, a strain came on his right knee, which was suddenly and forcibly bent. Some pain followed, and he thought he was severely hurt; but the next day he discovered that he was better, and that he could readily flex and extend the leg. At present, as he is now exhibited before you, he can flex it a little beyond a right angle, and can make complete extension with some force. He says he is not aware of any difference in the strength of the opposite limbs. Separation of patellar fragments two inches. Length of ligamentum patellæ same on both sides.

Evidently, in this case, the rupture of the ligamentum patellæ was due to the severe strain to which it had been subjected by the weight of the body, and the forcible contraction of the quadriceps extensor muscle. Whether transverse fracture of the patella usually results from direct or indirect violence is an open question. I agree with those, however, who contend that this injury may generally be traced to the latter cause; and I am sure that the same is true regarding rupture of the

ligamentum patellæ. Maydl, in investigating the etiology of this accident, analyzed forty-four cases, in only five of which the rupture could be attributed to direct violence. Most often it is occasioned by a powerful contraction of the quadriceps, occurring in an attempt to save the body from falling backward; at other times, from falling forward or sidewise. Violent flexion of the leg, accompanying a fall from a height, may produce it; and it has been known to occur spontaneously during an attack of convulsions, as also during forced flexion practised with the object of overcoming an ankylosis of the knee. In the last case muscular contraction cannot be concerned in the rupture, which must be ascribed in part to pathological changes in or around the affected joint. Adhesion and fixation of the patella, or rigidity and contracture of the quadriceps muscle, may, by preventing the descent of the patella when the knee is bent, cause the ligamentum patellæ to be lacerated during forcible flexion, either manual or instrumental.

In some of the cases I have collected from our hospital records, the agency of muscular contraction in causing the rupture is plainly evident. The case just narrated (X¹) is one in point. In another case (IV.), the man, while wrestling, was thrown down, striking the left knee. As he fell, he was conscious that something had given way; and on trying to get up, he found himself unable to extend the right, or opposite, leg. Another man (VII.) stumbled while carrying a barrel of flour; and in a violent but unsuccessful effort to save himself from falling forward, heard something snap, and felt his knee suddenly give way as he came down with his left leg helpless. Another (VI.), whose heel had been caught between two flagstones, and who squatted quickly to pick up his hat, felt something give way, and immediately fell to the ground, unable to extend his legs. In this case the rupture occurred on both sides. In Case XIII. the man slipped while crossing the street, and did not strike the knee. In Case XII., to be related presently, the injury was certainly due to direct violence, a heavy piece of timber having fallen across the knee. One patient (IX.) fell from a roof, sus-

¹ These figures refer to the table of cases appended at the close of this article.

taining fracture of the left thigh and rupture of the left ligamentum patellæ. Here the violence may have been direct, as also in Case II., in which a sailor fell from a jibboom a distance of thirty feet, striking his knee; and in Case XI., in which a fireman was buried beneath a falling building, and, on being extricated, was found to have received a fracture of the femur, a rupture of the ligamentum patellæ, and severe contusion of the injured limb. In Case I. the patient fell from a wharf into the water, hitting his knee against a boat. Whether, in the four cases last described, the rupture of the ligament was caused by direct injury, by extreme flexion of the knee, or by muscular contraction, must be a matter of doubt; and, in the remaining examples, the doubt concerning this point must be still greater. Thus, one man (V.), while engaged in carrying a plank, fell upon his left knee; another, who was assaulted and knocked down in front of his lodging house, struck his knee against the doorstep. In Case III., the patient, while walking, stumbled and fell, striking his knee against the ground. Now, in all these cases, the circumstance that the knee was hit seems to favor the supposition that the rupture was occasioned by direct violence. But it is quite likely that such an inference would be wrong, and that the fall upon the knee may have been the result, not the cause, of the rupture. This explanation is corroborated by the probability that, in all these instances, the extensor muscles were forcibly contracted at the moment the accident happened.

It is well known that rupture of the ligamentum patellæ is far more frequent in the male than in the female sex. I have been unable to find more than five published cases in which females have sustained this injury, and the thirteen subjects, whose cases I have recorded, were all males. The relative frequency of the accident in the latter may be accounted for by their greater exposure to its exciting causes, and by the greater strength and activity of their muscles.

In one case (VI.), already mentioned, the rupture took place on both sides simultaneously. Four other cases of this double injury have been recorded, namely, two by Shaw,¹ one by Gib-

¹ Trans. of Path. Soc. of London, vol. 5., 1854.

son,¹ and one by Hamilton.² In three cases (III., VII., X.), the rupture occurred in persons who had previously suffered from transverse fracture of the patella on the same side. In Case III. the patella had been broken one year previously, and ligamentous union had taken place. In Case VII. the fracture occurred eight months before the rupture, and the uniting band measured two inches in length. In Case X. the fibrous band was likewise two inches long, while a period of ten years intervened between the fracture and the rupture. I have found elsewhere only four other examples of this singular sequence,³ from which; I think, two conclusions may be drawn. The first is, that a fracture of the patella may establish a predisposition to rupture of the ligamentum patellæ. In Flower's case, in which the rupture took place at the patellar attachment, this end of the ligament seemed to have ossified during the repair of the fracture; and to this circumstance he was inclined to ascribe the predisposition. Such could not have been the explanation, however, in Markoe's case (III.) nor in the one I have reported (X.), as in both of these there was no evidence of ossification of the ligament, which, moreover was found to be ruptured at its tibial insertion. In the majority of instances, probably, the essential cause of the predisposition is a weakness of the limb induced by the earlier injury, which renders the individual less able to avoid the accidents that determine the later one. The second inference is, that the fibrous bond of union between the fragments of a broken patella may be able to bear a greater strain than the normal patellar ligament. This may be the fact, even when the uniting band is of considerable length, as in the two cases I have recorded. Additional evidence of the occasional strength of the ligamentous union of patellar fragments is afforded by the numerous examples of re-fracture of the patella in which the second fracture has taken place through a part of the bone hitherto uninjured. It is noteworthy that, when rupture of the ligamentum patellæ has been

¹ Gibson, *Surgery*, vol. i. p. 395, sixth edition.

² Hamilton, *Fractures and Dislocations*, sixth edition.

³ Nélaton, *Archives Générales*, 1858, p. 704, Obs. vi.; Flower, *Trans. Path. Soc. of London*, vol. vii., 1856; Bulley, *Med. Times and Gazette*, London, 1864; Zeis, *Archiv für klinische Chirurgie*, vol. vii. p. 755.

preceded by fracture of the patella, the two lesions have always been found to exist on the same side of the body. The longest recorded interval between the two accidents is ten years, in Case X.; the shortest, eleven weeks, in Flower's case.

In seven of the cases I have reported the seat of rupture is definitely stated. In three it took place at the upper, and in four at, or near, the lower attachment of the ligament. In two cases a small fragment of the patella was torn off; in one of these it could be distinctly felt, and in the other it gave rise to occasional crepitus when the ruptured parts were approximated. These results are in accordance with the general rule, that ligamenta is far less liable to give way in its middle than at one of its extremities—the lower being involved in about 50 per cent of all cases. The rupture, wherever it occurs, is usually complete; my notes of thirteen such cases furnish only a single instance in which a portion of the ligament remained intact.

The symptoms were in every case so plain as to leave no doubt concerning the nature of the injury. In one the amount of retraction of the patella is said to have been slight; in another it was two inches; but in all the gap between the severed parts could be made out. Prominent among the symptoms is inability to extend the leg. So far as I know, this loss of power is absolute when, as is usual, the rupture is complete. In transverse fracture of the patella, on the other hand, it occasionally happens that some power of extension remains immediately after the accident. An illustration of the preservation of this function to a remarkable degree came to my notice a few weeks ago, when a gentleman entered my office to consult me about an injury to his knee, which he thought he had sprained a few hours previously while playing in a tennis court. In the meantime he had been able to walk, and had gone down town to the stock exchange, and returned in a street car without suspecting the gravity of his injury, which, to my surprise, I found, on examination, to be a transverse fracture of the patella. The fragments, however, were in contact, and bony crepitus was well marked. We can readily understand why no such exception should ever be met with when the ligamentum patellæ is completely ruptured, since, under

these circumstances, nothing is left to transmit the force exerted by the quadriceps, except the insignificant aponeurotic attachment of a few of its fibres to the tibia.

The condition of the knee-joint was noted in six cases, and, in all but one, the joint is said to have been distended and painful soon after the accident. Whether, as seems probable in this form of injury, the laceration extends into the joint, and whether the distention of the latter is due to the presence of blood or of inflammatory effusion, are points which have not yet been demonstrated. In any case, the swelling generally subsides, under appropriate treatment, in the course of a week or ten days.

The treatment adopted in most of the cases herewith reported was essentially the same as that usually followed in fracture of the patella, comprising extension of the knee, elevation of the injured limb, cold applications to the joint, and the use of pads, straps and bandages for the purpose of approximating the ends of the ruptured ligament. As in the case of fracture of the patella, the retraction of the upper end appears to be largely owing to distention of the knee-joint with fluid; and, until this has been absorbed or otherwise got rid of, any attempt to force it downward will prove futile, and perhaps injurious. In one case (III.) in which compresses and tight bandages were employed very early, they certainly caused an aggravation of the symptoms, which compelled a suspension of this part of the treatment for a period of four weeks. The final result, however, was satisfactory.

As a rule, such treatment as that described is followed by a fair amount of recovery of the functions of the injured limb. I regret that the notes of some of the cases I have collected are so defective regarding the results obtained as to possess little or no value. We know, nevertheless, that the continuity of the ruptured parts is usually restored in the course of six or eight weeks, the knee meanwhile gradually regaining its normal size and shape. Afterward the joint generally becomes movable, and the power of extension returns to a variable degree. Occasionally both the physical and functional results are excellent, as in Weir's case (XIII.), in which, sixteen years after the injury, no difference could be discovered by measure-

ment between the length of the patellar ligaments of the opposite sides, and in which the patient declared that the limb injured was quite as good as its fellow. Such a result, however, is exceptional, and the patella is apt to remain permanently more or less retracted, sometimes to the extent of several inches. Generally, as after fracture of the patella, the impairment of the power of extension bears a direct ratio to the length of the fibrous band by which the severed parts are united; but this rule is not without exceptions. A case has been recorded in which a lengthening of six centimetres did not prevent complete voluntary extension of the leg; on the other hand, the power of extension may be seriously impaired, even when the uniting medium is short and firm. Here the disability is doubtless owing to some complication or sequel of the rupture, such as chronic inflammation of the knee-joint, atrophy of the quadriceps muscle, or adhesions between the opposed surfaces of the upper part of the synovial sac which lies underneath the quadriceps. In such cases flexion, as well as extension, is usually limited.

It is impossible to determine in what proportion of cases the power of extension is greatly damaged; but the number is larger than one would infer from a perusal of the published reports, in which very inferior results are often put down simply as "cures." We may be sure, however, that in a certain number of instances in which no union takes place between the ruptured parts, the power of extending the leg will be entirely abolished, and the act of walking rendered impossible without assistance. Hitherto such cases have been treated by some form of mechanical apparatus designed either to prevent the knee from being bent, or to make artificial extension by means of an elastic force; but, so far as I am aware, no attempt has been made to reëstablish the function of extension by an operation intended to restore the continuity of the ruptured ligament. Maydl states that, in a posthumous work by Veslingius (*Obs. Anat. et Posthum.*), published 1740, he found a notice of a case in which tenorrhaphy of the ligamentum patellæ was performed with success. He does not say, however, whether the injury was old or recent, and I have been unable to procure a copy of the work to which he

alludes. In the case of the patient now exhibited I operated eight months after the accident, by bringing together the separated ends of the ruptured ligament, and uniting them by sutures. The history reads as follows:

CASE II. Charles K., a healthy man, æt. 44, by occupation a rigger, was admitted under my care in the Roosevelt Hospital seven months ago, and gave the following history: In September, 1884, a heavy piece of timber fell across his right knee, and he was at once disabled and could neither walk nor extend the leg on the injured side. The accident occurred at sea, and the patient received no treatment beyond confinement in bed on account of pain and swelling of the knee. In December he entered a hospital in Calcutta, where the joint was incised to allow the escape of fluid. He recovered from the operation, but remained as weak in the knee as before, being unable to walk except when he wore a splint applied to the back of the limb in order to keep it straight. When he came under my charge he was still wearing a leather splint, which, although apparently well suited to its purpose, did not render locomotion easy. The gait was slow and unsteady, and the patient, otherwise in good health, was greatly discouraged in consequence of his infirmity, and declared his willingness to undergo any operation in the hope of regaining the usefulness of his limb. On examination the right knee was found to be tender on pressure, and moderately swollen from an accumulation of fluid in the joint. The patella was displaced upward about two inches; it was freely movable laterally, but could not be drawn down to its normal position. Above, its relations with the quadriceps could be readily distinguished, but below, it evidently had no connection with the tibia.

As nearly as I was able to ascertain, the ligamentum patellæ had been completely ruptured close to its inferior point of attachment, and no attempt had been made to repair the injury. In place of the ligament there was a gap into which the skin could be readily depressed until the fingers encountered the femoral condyles. The power of extending the leg was entirely absent, and the patient, when lying upon his back with his legs extended, was unable to raise his foot from the bed.

On May 19, last, I commenced an operation by making a longitudinal incision, six inches in length, in the median line on the anterior aspect of the knee, the centre of the incision being opposite the lower edge of the patella. The cut was subsequently lengthened both upward and downward until it measured nine inches. On exposing the injured parts, in doing which the knee-joint was freely opened, it

was found that the ligamentum patellæ had been torn away from the spine of the tibia, which was now covered by only a small amount of dense fibrous tissue, sufficient, nevertheless, to allow a firm hold for sutures. A little more than an inch of the ligament, in good condition, was normally attached to the patella. There was a complete lack of union between the ends of the severed ligament, and a great deal of difficulty was experienced in bringing them together after they had been freshened with the knife. Before the upper end could be drawn down and placed in contact with the lower one, it became necessary to make many deep oblique and transverse incisions into the median and lateral portions of the quadriceps; and even when this had been done as far as was deemed prudent, considerable force was required to secure apposition, which was maintained by two sutures of stout silver wire, the ends of which were twisted, cut short, bent flat-wise, and buried in the wound. The mucous and alar ligaments were found redundant, and were partly removed with the curved scissors. The incisions in the capsule of the joint were closed by catgut sutures, and the external wound was united, except at its upper and lower ends, in the same manner. Two bone drains, one on each side, were inserted into the joint through openings made for that purpose, and one into each extremity of the median incision. During the operation a solution of mercuric bichloride, 1:1,000, was applied freely to the wound, which was afterward covered with iodoform gauze. The limb was next enveloped in a moss-bag, moistened with the bichloride solution, and finally fastened to a long straight wooden splint, provided with a foot piece. Previous to the operation the knee and adjacent parts had been shaved, scrubbed several times with soap and water, then washed with oil of turpentine, and finally disinfected with a solution of mercuric bichloride.

The subsequent progress of the case was uneventful, except that, during the first four days, the patient complained of almost constant pain. This was so severe on the second day that I removed the dressing and examined the wound, which, however, showed nothing which would account for the man's suffering. The drainage-tubes were cleared of a few clots of blood, and a fresh dressing like the first was applied. On the fourth day the pain began to diminish, and soon afterward it disappeared altogether. The wound was not dressed again until July 7, seven weeks after the operation. It was then discovered that the wound had long before healed by primary union, except at its lower angle, where a minute skin ulcer remained, marking the site of one of the drainage-tubes. The wounds made for draining the joint were entirely closed. The patella was movable, as was

also the knee-joint; but no attempt was made to bend the leg beyond a few degrees. On July 21 the patient was allowed to get up, wearing a water-glass bandage. This could not be worn with comfort, and, a week later, was replaced by a leather splint, with which the patient walked about without much difficulty. He continued to use the splint until October, when he laid it aside. Meanwhile the knee has assumed nearly its natural size and shape, and it is evident that continuity of the ruptured parts has been reestablished.

My house surgeon, Dr. George S. Huntington, has, at my request, furnished me with the following precise description of the patient's present condition, which can be verified by the members of the society:

Measurements.—Thigh: Circumference at upper border of patella, right thigh $13\frac{3}{4}$ ", left thigh 14"; circumference at junction of middle and lower third, right thigh $13\frac{1}{4}$ ", left thigh $15\frac{1}{4}$ ".

Knees: Circumference of knee-joint over the patella, on both sides 13.9".

Leg: Circumference at junction of upper and middle third, right leg $12\frac{3}{4}$ ", left leg 13"; distance from tip of internal malleolus to lower border of patella, right side 15.6", left side 14.4".

Functional Result.—A line drawn from the middle of the upper border of the great trochanter to the centre of the outer surface of the external condyle is taken as the axis of the thigh. The axis of the leg is represented by a line drawn from the tip of the external malleolus to a point just anterior to the superior tibio-fibular articulation. On the left side in full extension of the leg, these lines form with each other an obtuse angle of 174° . On the right side, when patient is in the recumbent position, the amount of voluntary extension is as follows: The axis of thigh and leg forming an obtuse angle of 148° . When the patient is in a sitting posture, the amount of extension is increased to 155° .

Passive motion: Extension of leg possible to the normal limit. Flexion to a right angle. Rotation of the leg the same on both sides.

I will add that, in walking, the patient can easily and completely extend the leg; that for several weeks past he has been able to go up and down stairs without assistance, and that his limb is so steadily gaining in strength and freedom of action as to warrant the hope of further improvement.

At all events, I think it will be admitted that, in this case, the operation has conferred a great benefit upon him by restoring the usefulness of the limb; and that, in similar cases, sutur-

ing of the ligament deserves a further trial. The principal difficulty likely to be encountered, when the injury is not of recent date, is that of bringing into contact the ends of the ruptured ligament. In my case this was accomplished only after the rectus and the vasti muscles had been extensively scored, and even then the parts could not be brought together without decided tension. I am inclined to believe that the pain the patient complained of during the first four days after the operation was caused by the traction of the sutures, and that it was relieved only when the sutures had cut through and receded far enough to moderate the existing tension. And, although I neglected to note the level of the patella immediately after the operation, its present elevation may be held as proving that the segments of the ruptured ligament separated from each other to a considerable extent after they had been sutured, the gap so formed being now occupied by newly formed ligamentous tissue, like that which, in ordinary cases of this injury, is furnished to repair it.

That which has most interested and gratified me in this and in several other severe operations I have performed, in which the knee-joint has been involved, is the impunity with which this articulation may be opened, and indeed somewhat roughly handled, provided antiseptic precautions are scrupulously observed. This fact was especially forced upon my attention in a case of old fracture of the patella, in which I wired the fragments, one year ago, in the Roosevelt Hospital. The operation was performed in the usual manner, but the fracture was found to have been comminuted, and the fragments could not be brought into apposition without much difficulty, nor until the quadriceps muscle had been extensively exposed and repeatedly cut, in order to obtain the necessary elongation. Meanwhile, the bleeding was free, the knee-joint was frequently sponged out and irrigated, and the operation was prolonged, as well as severe; yet the patient recovered without an unpleasant symptom, under the use of a single dressing; and when this was removed, at the end of eight weeks, I discovered that the wound had healed throughout by the first intention, and that neither suppuration nor adhesive inflammation had taken place within the joint, which had a limited range of easy

motion. Such a case affords, according to my judgment, indubitable proof of the marvellous improvements in operative surgery which have been wrought by antiseptic methods; and, when I see it stated in a standard American text-book, published only three months ago, that "the alleged superiority of the antiseptic method cannot be said to have been as yet demonstrated," I am amazed at the author's incredulity. Even among those who practice antiseptic surgery, however, some hesitation is occasionally felt about opening the larger joints, and operations involving the healthy knee-joint are at present regarded by many with the same kind of apprehension which, not a great many years ago, deterred surgeons from invading the peritoneal sac. The latter procedure is, as we now know, reasonably safe, and I cannot doubt that the operation of opening the knee-joint is already, when properly performed, far safer. I confidently anticipate the time when skilful and careful surgeons will be able to divest it of all danger either to life or limb; and, whenever this period arrives, our time-honored, but clumsy, tedious, and uncertain method of treating both fracture of the patella and rupture of its ligamentous attachments may well be abandoned in favor of some form of operation calculated to secure an immediate union of the divided parts.

CASES OF RUPTURE OF THE LIGAMENTUM PATELLÆ.

No.	Hospital.	Age and Sex.	Date.	Observer.	Side of rupture.	Cause.	Condition.	Treatment.	Results.
1.	New York.	32. M.	1844.		Right.	Fall from a wharf into water, striking knee against a boat.	Joint much swollen; rupture at patellar insertion, carrying away a minute fragment of bone; patella not much retracted, and easily brought down.	Leeches, poultices, low diet; at end of ten days pads and straps.	Firm union; discharged "cured" at end of four months.
2.	New York.	26. M.	1854.	Watson.	Right.	Fall, thirty feet, striking knee.	Rupture of ligament just above tibial insertion; joint distended and painful.	Extension, cold lotions; crutches after four weeks.	Discharged "cured" at end of two months.
3.	New York.	32. M.	1859.	Markoe.	Left.	Slipped and fell, striking left knee.	Marks of fracture of patella sustained a year previously; fragments united by ligament; patellar ligament ruptured at tibial insertion; joint greatly distended and painful.	Single inclined plane; evaporating lotions; compress and bandage, which had to be removed on account of pain; reapplied four weeks later.	Discharged eleven weeks after accident with firm union.
4.	Bellevue.	60. M.	1870.	Hamilton.	Right.	While wrestling, was thrown on left knee, and felt something give way; on attempting to get up, was unable to extend right leg.	Ruptured ligamentum patellæ.	Plaster-of-Paris bandage; figure-of-8 bandage to knee.	
5.	Bellevue.	40. M.	1874.		Left.	While carrying a plank, patient fell, striking left knee.	Complete rupture of ligament; patient unable to extend or to extend leg; no pain or distention of joint.	Plaster-of-Paris bandage day after accident; renewed three times, and finally removed at end of six weeks.	Ligament united to tibia; knee somewhat stiff when patient was discharged, eight weeks after injury.

CASES OF RUPTURE OF THE LIGAMENTUM PATELLE. *Continued.*

No.	Hospital.	Age and Sex.	Date.	Observer.	Side of rupture.	Cause.	Condition.	Treatment.	Results.
6.	Bellevue.	50. M.	1874.	Wood.	Both.	Patient, whose heel had been caught between two flagstones, quickly picked up his hat, felt something give way, and fell to the ground helpless.	Each patella retracted from rupture of ligament; any extension of legs absolutely impossible.	Commenced 7 months after injury; posterior splint; figure-0-8 bandage.	Left hospital a fortnight after admission; result not known.
7.	Bellevue.	22. M.	1874.		Left.	Patient, while carrying a barrel of flour, stumbled and made a powerful effort to save himself from falling forward; heard something snap as he fell; found left leg helpless.	Signs of old fractured patella eight months previously; firm fibrous band two inches in length; immediately below patella a groove corresponding with ruptured ligament.	Posterior splint.	
8.	Bellevue.	52. M.	1878.	S. Smith.	Left.	Was knocked down, striking knee against door-step.	Much swelling and effusion in joint; rupture of ligament close to its attachment to patella.	Posterior splint; ice bag; afterward figure-0-8 bandage and traction with adhesive plaster.	Patient discharged with stiff knee eight weeks after injury.
9.	Bellevue.	10. M.			Right.	Fall from a roof.	Fracture of left femur; rupture of right ligamentum patellæ, incomplete, a few fibres only remaining intact.		
10.	Roosevelt.	35. M.	1882.	Sands.	Right.	Slipped while getting on a street car, and felt something give way.	Marks of old fracture of patella; fibrous uniting band two inches long; ligamentum patellæ ruptured near its tibial insertion.	Ice bag; extension, at first horizontal, afterward vertical; rubber bandage.	Recovery, with useful limb.

11.	Bellevue.	34	M.	1884.	Dennis and Bryant.	Left.	Buried beneath a falling building.	Rupture of ligamentum patellæ; fracture of lower third of femur; severe contusion of limb.	Double inclined plane for thirteen days; Buck's extension twenty-five days; plaster-of-Paris bandage six weeks.	Two years after injury patient has a stiff knee with the leg extended; flexion easy to the extent of 5 to 6 degrees, where it is suddenly checked, apparently in consequence of adhesion and shortening of the quadriceps at seat of fracture. Ligamentum patellæ reunited and firm, being lengthened only 1/2 an inch. Patella displaced laterally but not downward. Contraction of quadriceps causes no tension of ligamentum patellæ.
12.	Roosevelt.	44.	M.	1885.	Sands.	Right.	Blow from a heavy piece of timber.	Eight months after accident power of extension entirely lost; patella retracted two inches; a depression in place of ligamentum patellæ, which seems to have been ruptured near tibial attachment.	Joint opened; ligament sutured.	Six months after operation power of extension regained sufficiently to enable patient to walk with ease.
13.	St. Luke's.	47.	M.	1869.	Weir.	Left.	Slipped while crossing street; did not strike knee; walked with assistance twenty or thirty feet after accident.	Rupture of patellar ligament.	Limb extended in plaster-of-Paris splint for six weeks.	Began to walk soon after removal of splint. Sixteen years later (1885) injured limb as good as other. Ligament same width and length as other by measurement.

EXCISION OF THE TARSAL BONES.¹

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DISEASE of the tarsal bones is not an uncommon occurrence among children who apply for admission into hospitals. The following paper is based upon the cases of nine patients operated upon at St. Mary's Free Hospital for Children. Although there is nothing very noteworthy in any of the cases taken individually, yet, when taken together, they form a group from which one may draw a few practical deductions.

The following plan of operation was followed in all but one case, to which reference will be made further on: After rendering the limb bloodless by an Esmarch bandage, if the os calcis is to be removed, an incision is made from a point corresponding to the inner edge of the tendo Achillis and about an inch above its insertion, outward and then forward on the outer aspect of the foot to a point midway between the external malleolus and the proximal end of the fifth metatarsal bone, the incision being made directly down to the bone. The only tendons denuded are the tendo Achillis and that of the peronæus longus where it passes over the lateral surface of the os calcis. No vessel of any size requiring ligature is divided. The incision will be found to afford plenty of room. The periosteum is then divided and separated from the bone as far as possible with an elevator; it will then be found that the bone can be removed either as a whole or in pieces, the ligaments being divided as they present themselves. After removing all the bone and well washing out the cavity left by the operation, the constricting bandage is removed, and any bleeding points are secured. The edges of the incision are brought together with silver wire, except at the posterior part of the wound, which is

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left for a drainage-tube. I use silver wire because, in my experience, it is often necessary to hold the parts in coaptation longer than can be done with catgut. The foot is usually put up in a tin leg-splint, with a foot-piece at right angles to the leg. The cavity left after the removal of the bone is in some cases swabbed out with chloride of zinc, in others dusted over with iodoform. None were put up in a permanent dressing. The following is an abstract of the cases:

CASE I. F. M., æt. 3, came to the hospital in 1874. She was an unhealthy-looking child. There was a large sinus, from which there was a considerable discharge, situated upon the dorsal aspect of the right foot, over the upper border of the cuboid bone. There was also disease of the first metacarpal bone of the left hand. In September, 1874, the patient was etherized, and the disease was found to be confined to the os calcis. This was freely gouged so as to remove all diseased bone. The portion left seemed hard, and was supposed to be healthy. In January, 1875, as the wound did not close, more diseased bone was removed. In April, as the foot was no better, an incision was made by splitting the tendo Achillis and then extending the incision forward upon the plantar surface of the foot, so as to afford room to remove the remains of the os calcis. The cavity thus left was stuffed with lint. The wound gradually filled up, and she was discharged with her foot in good condition, the heel somewhat flattened and with a deep cavity behind.

November 1, 1885, eleven years after the operation. Upon examination it was found that the foot was in good condition. There had been no return of disease, no pain about the foot, and the child walked with but a very slight limp, scarcely perceptible. The heel, where there had been a deep depression at the time of her discharge, had now filled out, so that the point of excision was represented by a mere line occupying the posterior rather than the plantar aspect of the foot. The contour of the heel had filled out. There was an obliteration of the plantar arch. I do not think that there had been any reproduction of bone.

CASE II. M. D., æt. $3\frac{1}{2}$, had had disease of the os calcis for some time. The bone had been gouged twice before the patient came to the hospital, but without any permanent relief. He was a healthy-looking boy. There was a sinus on the external aspect of the foot over the os calcis, through which diseased bone could be detected. In February, 1879, the old line of incision was reopened. There was

found a sinus in the os calcis leading to a cavity in which was a loose piece of bone of about the size of a filbert. The walls of this cavity were smooth and hard. The necrosed bone was removed and the wound closed, in the expectation that, the cause of irritation being removed, recovery would take place; but after a time the parts assumed the same condition that had existed before the operation. In May the bone was excised. It was found harder than normal. After the last operation the patient made a good recovery, and was discharged, walking well. He has not been seen since his discharge from the hospital.

CASE III. M. R., æt. 7, was admitted in February, 1879. Three months previous she began to complain of pain in the heel of the right foot. It then began to swell, and three weeks before she came under observation an abscess opened posteriorly, and had continued to discharge since. Diseased bone could be detected with the probe. In March the os calcis was removed. It was found entirely diseased. She was discharged from the hospital in June, able to walk. She was seen November 20, 1885. She then walked well, with scarcely a limp, had had no pain, and the old line of incision had not reopened. About one year ago, five years after she left the hospital, an abscess formed on the dorsal aspect of the foot, and has continued to discharge ever since. There is now a sinus at this point. The patient seems healthy, and experiences no inconvenience from the foot. I presume there is diseased bone. There has been some reproduction of the os calcis.

CASE IV. Sarah J., four years before admission, received a cut on the plantar surface of her right foot from a piece of glass. The wound had never closed. Three years ago some diseased bone had been removed, and since then several small pieces had come away. In November, 1879, the os calcis was removed. The bone was extensively diseased. In February she was discharged, able to walk well. A week after her discharge she was brought to the hospital with a superficial abscess about the point of operation, caused, it was said, by walking with a badly fitting shoe. She was sent home in a few days. In May, 1883, her friend reported that she had had no further trouble, and that she walked well.

CASE V. C. R., æt. 10, came to the hospital in March, 1881, with the following history: Six months before, without any known cause, a swelling had appeared at the back of the heel; an abscess had formed and opened, and had continued to discharge ever since. The os calcis was removed, and was found to be much diseased. He was sent home

in June with a useful foot. He was seen November 20, 1885. There has been no change in the foot since he left the hospital; he can walk well, with but little, if any, limp, and is now employed as an errand boy in an apothecary's shop. There is, however, limited motion at the ankle-joint. There does not appear to have been any new bone formed.

CASE VI. Peter H., an unhealthy-looking boy, æt. 6, was admitted in September, 1881. He had disease of the right os calcis, and carious bone in various portions of his body. In October the os calcis was removed. He did well for a time, then his foot began to swell, the old line of incision opened, and he was in a worse condition than before the operation. Other tarsal bones became involved in the disease. The bones were gouged, but with no improvement. In March, 1883, Syme's amputation was performed. The flap did well for a time, but finally sinuses began to form, and he was removed from the hospital. On examining the parts after their removal, there was found considerable reproduction of bone.

CASE VII. K. A., æt. 3, was admitted in January, 1882, with disease of the os calcis of some duration. The bone was removed in February, 1882. She was discharged April 20, with the wound all closed, and able to walk well. Nothing has been heard from her since she left the hospital.

CASE VIII. Joseph M., æt. 6, came under observation in February, 1882, with a history of disease of the bones of the left foot of some duration. There was a sinus over the astragalus through which carious bone could be detected. The foot was much swollen. On March 20, 1882, the sinus over the astragalus was enlarged, and that bone removed by gouging. It was then found that the anterior portion of the os calcis was diseased. The anterior two-thirds were removed through an incision on the external aspect of the foot, leaving the posterior portion of that bone. The foot did well for a time, the anterior wound closing, but a sinus persisted posteriorly. In October, as the portion of the os calcis left was evidently diseased, it was removed. After this the wound closed, and he was discharged with a sound and useful foot. He has not been heard from since.

CASE IX. Edward L., æt. $2\frac{1}{2}$, was admitted in September, 1882, with an extensive swelling on either side of the left ankle-joint. Fluctuation was marked. He had been lame for some months. The abscess in the ankle-joint was opened under ether, and the lower end of the tibia and the articular surface of the astragalus were found denuded

of cartilage. The diseased bone was gouged and the joint drained. The abscess continued to discharge for some time, and then the sinus closed about the ankle-joint, but a new opening formed over the anterior surface of the astragalus in front of the ankle-joint. Subsequently the astragalus and the os calcis, which were found diseased, were removed. At the time of the operation there was no disease about the end of the tibia, and the bone was well covered. The patient was discharged from the hospital with a useful foot, all sinuses being closed. November 19, 1885, he was seen at the hospital. He has had no trouble with the foot since. Can walk well with a slight limp. The end of the tibia occupies a lower plane than that of the sound limb, so that the ankle-joint is depressed. There has been some reproduction of bone.

Of these nine cases the os calcis was alone removed in seven, the os calcis and astragalus were removed in two. A useful foot was obtained in eight, and in one amputation had to be performed. In but one of these eight cases has there been any return of the disease in the other tarsal bones, and in this not until five years after the operation. All but three of the patients have been seen or heard from within the past year, and in all, with but one exception, has the foot continued in good condition, and the patient been able to walk and be about with other children without any inconvenience except a slight limp. In all there has been an obliteration of the plantar arch, with a tendency to walk upon the inner border of the foot. All complain that the inner side of the shoe is worn out first, but there has been no pain.

In regard to a partial removing or gouging of the os calcis for disease, my own experience has not been flattering. Although a faithful trial of this procedure was made in four cases, no permanent cure was obtained, and only after total extirpation of the diseased bone did the sinus close. In one case the bone had been operated upon three years before the patient's admission, with no apparent benefit.

Case II, where there existed a sinus leading into the centre of the os calcis, in which was imprisoned a loose piece of dead bone, seemed very favorable for such an operation, yet it failed to stop the disease, and a total excision of the bone had finally to be performed. In another case the posterior third of the os

calcis was left, as it was apparently healthy, but recovery did not take place until this, too, had been removed. I am well aware that others have obtained good results from partial excision or gouging, but perhaps it was in older subjects and under more favorable circumstances. My own experience is entirely opposed to a partial operation in children. Perhaps one cause of the want of success in these cases is the fact that the bone was sclerosed and incapable of filling up the cavity left by gouging.

I have never made a resection of the ankle-joint in children, although I have seen some cases of disease of this articulation—I mean in which the lower end of the tibia and fibula was extensively diseased. The patients made a good recovery.

DISCUSSION.

Dr. H. B. Sands said that it seemed to him that a distinction must be drawn between tubercular inflammation and osteomyelitis of the os calcis. So far as he had been able to judge while listening to the paper, Dr. Poore had reported only one case of true necrosis of the bone. In this there was a cavity with healthy walls, inclosing a piece of dead bone, which was removed by operation because the cavity would not close. It was further stated that in this case when the os calcis was removed it was found to be firmer than normal, which would imply that it was not carious, and that the previous failure to obtain a cure was, as Dr. Poore had intimated, due to a refusal on the part of the bony cavity to fill up. The speaker doubted the necessity of removing the whole os calcis in cases of necrosis unless the necrotic process involved the entire bone, the indication being to remove only the loose sequestra. He recalled a case which had occurred about fifteen years before in a lad *æt.* 10, who was supposed, by the late Dr. Van Buren, the late Dr. Parker, and himself, to be suffering from caries of the tarsus. There were several sinuses in the foot, and it was advised that the foot should be amputated. But an exploratory incision was made, and the os calcis was found to be a shell, containing a large number of pieces of dead bone within a cavity which had a smooth lining, such as was usually found in bones containing necrotic tissue. The pieces of dead bone were removed, and, although the walls of the os calcis were exceedingly thin, the cavity filled up within a few months, and the wound healed. He had not had much experience in dealing with the os calcis in children, but he thought that in adults partial excisions were often successful. He was somewhat surprised

to learn that caries was so often limited to the os calcis. His own experience had been that this disease was apt to attack the astragalus and scaphoid, and other bones of the tarsus, rather than the calcaneum alone. He thought the tendency nowadays was to avoid excisions in cases of caries, and that the use of the gouge, or sharp spoon, as it was called, often gave satisfactory results. He believed that in one of the children presented the condition of the foot corroborated the statement which he had made a month ago—that after the removal of a large portion of the tarsal bones, provided the periosteum was left, considerable reproduction would occur. It was evident in that case that, although the entire os calcis had been removed, there had been a considerable reproduction of bone. It seemed to him to be a point worthy of consideration whether, in caries, excision should be preferred to an operation which was partial, and which aimed to remove only the diseased tissues. It might occur, however, that, if a large part of the interior of the os calcis was removed, the space would remain open, although much might be done to overcome that difficulty by nailing down the soft parts or fastening them by deep sutures. He was willing to admit, however, that the results obtained in Dr. Poore's cases had been excellent.

Dr. Poore said that in almost all the cases he had reported the patients were in the hospital for a long time, and that where gouging had been performed the interval between the gouging and the excision was in some cases a year at least. He had given the patients all the chances of recovery he could, but, as suppuration had continued, the condition of the tarsus had not improved, and small pieces of bone had worked out, he had resorted to excision.

Dr. Sands asked if it was good practice to leave a case for a year after an operation. Was it not rather desirable to follow one operation by another, with a view to removing all the diseased tissue as quickly as possible?

Dr. Poore said he had performed gouging in one case four times within a year. He had been very much disappointed in this operation. He had certainly expected to see some patients get well after it, but he had never seen such a result. It might be because he had dealt with young children, the patients having been mostly under four years of age.

Dr. Lange recalled a very limited number of cases of tuberculous affections of the os calcis and astragalus in which the disease had been so limited that it had not been necessary to remove the bones entire. He had had one such case where the principal seat of the disease was in the bones of the ankle-joint. There was also a tuberculous seques-

trum in the os calcis, which was removed, and the entire shell of the bone left, and finally recovery took place. He thought that in a good many cases of tuberculous necrosis recovery would eventually take place after the removal of sequestra and scraping. It seemed to him that in Dr. Poore's cases a striking point was the difference between the reproduction of the os calcis and that of the astragalus; there had not been a reproduction of the astragalus. In some of his own cases of total excision of the ankle-joint he had observed the same thing, and probably it had been this which had caused the amount of shortening in Dr. Poore's cases. He had twice excised the tarsal bones during his service in Bellevue Hospital, the first and second rows, and in one instance cut away also the surface of the os calcis and astragalus; in the other the extirpation was not so extensive, but the result was a good one, although the patient was an adult. The result in the first case he could not give, for the patient was removed from the hospital because she refused to submit to a secondary operation. The results of other surgeons were rather encouraging for operative interference—for instance, those reported by Neuber some years ago.

EDITORIAL ARTICLES.

ON THE INDICATIONS FOR LAPAROTOMY IN CASES OF INTESTINAL OBSTRUCTION.

Cases of intestinal obstruction are not limited to hospital experience, nor to great cities, where special skill and facilities for their management are attainable. They are as likely to confront the isolated practitioner in a frontier settlement as his colleague in the great city. In many instances they are characterized by a steady and rapid march to a fatal termination, a march that can be interrupted by no possible therapeutic means, other than section of the abdominal wall, exposure of the obstructing agent, and its prompt removal. In these cases, when once their nature has been recognized, the medical attendant is reduced to the choice of either abandoning his patient to certain death, or of resorting to laparotomy for the possibility, faint though it may be, which it alone holds out for relief and recovery. In acute cases of intestinal obstruction, as a rule, relief, if it is to avail at all, must be afforded early. Early diagnosis and prompt operation are the two elements which must combine to secure any hope of recovery.

No question exists as to the propriety and necessity of laparotomy for the relief of certain classes of intestinal obstruction, when once the diagnosis is clearly established. It is to the matter of diagnosis, therefore, that an immediate and vital interest must always attach. In the following review of some aspects of laparotomy for the relief of intestinal obstruction, I have given, for the same reason, most prominence to diagnostic considerations, and especially to those which are of marked clinical importance. I have attempted to follow the order in which they would most helpfully be considered in the presence of a case of possible intestinal obstruction. For the purposes of this review I do not deem it necessary to make out an exhaustive list of all the possible conditions that may produce obstruction of the bowels. It will be sufficient to mention those which occur with such a degree of

frequency that they would be likely to be taken into consideration in forming a diagnosis in any given case of intestinal obstruction.

To simplify the matter still more, the general division of cases into those that are *acute* and those that are *chronic* in their nature may be made. Under the head of chronic cases fall those due to atony of the bowel with fecal impaction, to chronic peritonitis and peritoneal abscesses, to the pressure of intra-abdominal tumors, to malignant disease of the intestine, to simple stricture from inflammatory thickening and contraction at some point of the intestinal wall. Obstruction from any of these causes is of slow and gradual development. Though the differential diagnosis between these various conditions is not always possible, still the line which separates them from the class of acute cases is strongly marked. Ample time for their study and for determining upon the choice of operative procedures when complete obstruction is threatened is possible.

This entire class of cases, though often requiring laparotomy, in some of its modifications, for their relief, is foreign to the special line of thought in this present communication, and will not be further referred to.

Those rare cases of obstruction of the bowels which are caused by the passage of foreign bodies into them, either per os or per anum, or by the lodgement of large gall stones that have found their way into the intestinal canal, or by the formation of intestinal concretions, produce the symptoms of simple obstruction, which is usually somewhat chronic in its course, unless, as the result of ulceration, a local peritonitis or a perforation of the intestine is precipitated, when they develop acute symptoms that then range them with the general class of acute cases. In the case of the introduction of foreign bodies from without, the history is generally such as relieves the diagnosis of any uncertainty, and indicates clearly the necessity and object of operative interference. The other cases of this group are often exceeding obscure as to their nature, requiring either an explorative laparotomy or a post-mortem examination to settle the diagnosis. As to the propriety of an explorative operation, the same conditions must determine as in other cases of an acute nature, in connection with which the question will be considered.

We come now to the general class of acute intestinal obstructions. In this class three great groups of cases range themselves, viz., intussusception, volvulus and internal strangulation.

Of these *intussusception* is the most common form; it comprises one-third of all cases of intestinal obstruction, of every variety (Treves). Its symptoms are usually so clear and pathognomonic that the question of diagnosis is not the one that long engages the surgeon's attention. Will rest, starvation and opiates bring about spontaneous unfolding of the invagination? Can the down pushed portion of intestine be pushed up by insufflations or injections from below, or is the prospect of spontaneous relief by sloughing and subsequent discharge by the natural passages of the invaginated gut sufficiently great to warrant temporising in expectation of its occurrence? These are the questions to be raised by the surgeon before the necessity of laparotomy is considered: How long should one wait for the spontaneous unfolding to take place? How often repeated should the insufflations and injections be, and are they attended with any inherent hazards?

The recent researches of Mr. Treves¹ have given us a statistical basis upon which to rest an answer to these questions. Seventy per cent of all cases of intussusception terminate in death, and 80 per cent of these die within seven days. Elimination of the gut by gangrene occurs in about 24 per cent of all the cases, but no less than 40 per cent of these die of the immediate results of the separation.

In other words, only 30 per cent of those who become the subjects of intussusception recover. Half of these recover without unfolding of the invagination through a process of gangrene and sloughing. The remaining half, being 15 per cent of the whole number, includes all those in which, spontaneously or by art, the invagination is overcome.

The period during which it would be reasonable to expect a spontaneous unfolding of the invagination, or that insufflations or injections from below will be efficient, is a comparatively short one. After the lapse of possibly forty-eight hours the case, as a rule, will have resolved itself into one of barely possible recovery after gangrene, or of death, unless laparotomy be invoked for a possible additional chance

¹ Treves.—The Operative Treatment of Intestinal Obstruction.—Brit. Med. Jour. 1885. Aug. 29, p. 387.

of recovery. The recommendation of Mr. Treves is that laparotomy should be performed at least within the first forty-eight hours, and, if possible, within the first twenty-four hours, provided, of course, that all other measures have failed. Mr. Bryant¹ is equally decided in his recommendations. Of inflation, he says that it is "under all circumstances, hazardous and dangerous, although success in exceptional cases may be recorded. Laparotomy should be proposed in all cases of acute intussusception, as soon as a diagnosis is made, and of chronic, which have failed within three or four days, at the most, to be relieved by other treatment."

The readiness with which the surgeon will have recourse to laparotomy will depend upon the confidence which he may have in the relative innocuousness of the operation when properly performed, upon his own experience in abdominal surgery, and in his reliance upon his ability to control the conditions which the abdominal section may develop. The operative measures demanded for properly dealing with the invaginated gut are not complex nor difficult of execution. The seat of intussusception having been brought to view, its reduction, if possible, is to be effected by gentle squeezing and traction. If irreducible, or already the seat of gangrene, the affected parts are to be cut out and an artificial anus established.

Volvulus, or acute twisting of a loop of intestine upon itself in such a way as to produce obstruction, is the least frequent of the causes of acute obstruction. The sigmoid flexure is the most frequent seat of the accident. Its symptoms resemble those of internal strangulation, though more localized and with a less speedy advance toward death. It may not infrequently be diagnosticated with some degree of certainty, though its differential diagnosis previous to opening of the abdomen is unimportant. Its certain end is death, the average duration of life being but six days (Treves), the usual cause of death being peritonitis. By way of treatment, rest, starvation and opium may alleviate symptoms and prolong life, but are ineffectual to determine the untwisting of the volvulus. Enemata are harmful, as they tend simply to tighten the twist.

Prompt laparotomy is the only resource available for its relief, nor

¹T. Bryant Harveian Lectures.—Brit. Med. Jour., Nov. 22, 1884.

even after the abdomen has been opened is the reduction of the twist often an easy matter to accomplish.

We now come to the consideration of the last group of cases of acute intestinal obstruction, that of *internal strangulation*.

In the consideration of the diagnosis of cases of intestinal obstruction, it would appear that the diagnosis of this class of cases has been reduced to a considerable degree of certainty by the process of exclusion, certain cases of obstructions by gall stones or intestinal concretions, and of volvulus being alone likely to be confounded with internal strangulation. In considering the question of treatment, the possible confounding of cases of these kinds with one of internal strangulation is unimportant for the indications for treatment are the same. There is more difficulty in differentiating certain cases of acute strangulation from some other forms of intraperitoneal accident, such as internal hæmorrhage, the rupture of an abscess into the peritoneal cavity, or perforation of the bowel by ulceration, with the escape of intestinal contents. With reference to the question of laparotomy, however, these bring no additional complication; the threatening symptoms which they excite, alike with those that attend the more acute and severe cases of strangulation, demand immediate laparotomy as the only possible source of relief.

The symptoms which indicate the occurrence of internal strangulation will be the more unmistakable the more acute and urgent the case. So that the more imperative the need for relief, the more distinct are likely to be the signs that may guide the surgeon to immediate interference.

The intraperitoneal conditions that may determine strangulation of some portion of the intestine are diverse, but it matters nothing whether the constriction is caused by a band of organized lymph, an adherent omentum or diverticle, a peritoneal pouch or ring, or a mesenteric foramen, or what portion of the intestine may have become nipped in the constricting orifice, the final fatal issue is sure, depending for the speed with which it arrives upon the amount of the bowel involved and the tightness of the constriction. Opium may relieve pain and enemata of hot water may defer collapse by the supply of heat and moisture

that they give, Cathartics will aggravate the difficulty and hasten the end. Laparotomy alone holds out any promise of radical relief.

How soon shall laparotomy be done?

Plainly the answer is, as soon as there is a reasonable degree of certainty that strangulation of the intestine has taken place. Truly, delays are dangerous in dealing with cases of the kind under consideration.

But suppose that upon opening the abdomen no intestinal strangulation should be found?

I would by no means encourage an indiscriminate and hasty resort to laparotomy, but I can hardly conceive that an intelligent practitioner would come to the conclusion that a disturbance had taken place within the abdominal cavity of so profound a character as to induce him to incise its walls for its relief, without the result amply justifying the attempt. The condition developed may not be found as supposed, or it may prove to be of a character not susceptible of relief, but the operation will have had the result of clearing up a hitherto obscure condition, or of satisfying the operator that he has not denied to his patient any possible chance of relief; but if it is found to be of a nature susceptible of relief by performing the laparotomy, he has already taken the first step in the direction of securing that relief. From my point of view I am led to think that there is far more danger of operative interference being delayed until the period when it may be of avail has passed, than that an unnecessary and hasty operation would be done.

The assemblage of symptoms which will guide a physician to the conclusion that conditions of an imminently threatening character have developed within the abdominal cavity will not always be the same, nor can an analysis and description of them be so clearly made as to convey an adequate idea of them to one who has not personally observed them.

The amount of pain may vary, but yet in its most severe and persistent forms it may not differ from that experienced in conditions of a totally different nature; vomiting is equally variable in its severity and persistency. When the matters rejected become stercoraceous in character it is pathognomonic of obstruction, but a case may proceed to a fatal termination without any stercoraceous vomiting.

Inspection and palpation of the abdomen may be entirely barren of information; in many instances everything will be masked by a general tympanitic distension, while in others points of special tenderness or distinctly defined tumors may be discernible. Persistent constipation, of course, is present, but the very knowledge that many cases where persistent constipation has been a prominent symptom, have ultimately been relieved through the use of powerful cathartics and copious enemata, has tended to encourage the resort to similar agencies in all cases where the existence of constipation is looked upon as an important element in the case, even though other concomitant symptoms of an acute nature, if properly considered, would awaken the suspicion that the constipation was but a result, and not a cause of the difficulty. The mere length of time during which complete constipation may have existed is one of the least important symptoms to be considered, although the fact of the existence of constipation is by no means to be ignored.

In any given case not only will all the local features which it may present have to be considered in their relations to each other, the pain, the vomiting, the abdominal tenderness and swelling and the constipation, but also the general effect which the patient may exhibit. I have been especially struck, in all the cases of this kind which have come under my own observation, by the marked evidences of profound general disturbance which they invariably present. But a glance is required to see that they are desperately ill. The anxious countenance, the pinched features, the contracted pupils, the general restlessness, all speak of an imminent danger, of which an additional warning is given by the weak and thready pulse.

When a patient is found to present an assemblage of symptoms of so threatening a character as those just outlined, laparotomy presents itself not only as a legitimate recourse, but as the one measure which, when properly executed, offers in all cases the best promise of affording relief, while it is in some the only possible way of escape from speedy death. Far be it from me to lightly pass over the hazards and difficulties which inhere in laparotomy. But even if they were greater than they undeniably are, the very desperate character of the conditions, to relieve which the procedure is the only possible resource, would

make its adoption none the less imperative. The true line of work to be pursued is, first, to invoke the operation before the strength of the patient is too much exhausted for the unavoidable shock of the operation to be borne, and, second, to so improve the technique of the operation as to reduce its hazards as much as possible.

LEWIS S. PILCHER.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL SCIENCE
IN ITS SURGICAL RELATIONS.

(Continued from Page 155.)

B. OSTEOMYELITIS.

Acute osteomyelitis has of late years been considered by many surgeons and pathologists to be an infectious disease of a specific nature. Rosenbach, of Goettingen, working on the subject of surgical infectious diseases, and publishing his researches in the *Deutsche Zeitschrift für Chirurgie*, advanced this opinion in the year 1878¹, while Kocher, of Berne, believed the infection to be simply a septic or a putrid one.²

Pasteur, Ogston and other observers had found micrococci in osteomyelitic pus, and Koch had photographed them; still no evidence of their specific nature was procured.

Considerable interest, therefore, was awakened by a publication of Geheimrath Struck, the director of the Imperial Board of Health, which appeared under the title of a preliminary communication in No. 46 of the *Deutsche Medicinische Wochenschrift* in November, 1883—during the time that Koch was absent on behalf of the cholera commission—and which contained the announcement that Dr. Becker, one of Koch's assistants, had succeeded in cultivating the specific micrococcus of osteomyelitis. By inoculating potato-soils and soils prepared with peptonized and gelatinized infusion of meat and with sheep's blood-serum, with pus from five cases of acute osteomyelitis, Becker succeeded in

¹ Vol. X, pp. 369 and 492. "Experimentell-klin. Studie über die Ätiologie der Osteomyelitis.

² L. c., vol. XI, p. 87, and Reports 7 Congress d. Ges für Chir. 1878. II Part, p. 1.

obtaining certain orange-colored cultures in a few days; and after some further days the gelatine soils became liquefied, and an orange colored sediment could be observed in the test-tubes. An odor of "spoilt starch paste" was noticeable after exposure to the air. The micrococcus resembled Koch's diagram in size and appearance.

Inoculations performed on animals with considerable quantities of the culture material proved highly toxic in their effects. But when the bones were subjected to injuries or subcutaneous fractures a few days before the micrococci were injected, tumor of the injured limbs was first observed and emaciation and death ensued after twelve or fourteen days. A great amount of pus was always found at the seat of the injury, the periosteum was detached from the bone, and the medullary cavity was filled with pus. In three cases embolisms containing micrococci were found in the lungs and kidneys.

Culture experiments performed with the pus and blood yielded pure cultures identical with the first ones. This result taken together with some experiments conducted by E. Hahn¹ who had also succeeded in producing from osteomyelitic pus orange-colored cultures, which in their growth liquefied the gelatine soils, tended to confirm the theories of the specific nature of the disease.

In the following April a paper was published by F. Krause, an assistant at the surgical Clinic of Halle,² containing accounts of experiments dating back to May, 1883, which, on the whole, confirmed Becker's results. Krause inoculated serum soils, peptonized extract-of-meat, gelatine, and isinglass soils prepared with extract of meat, with pus from unopened osteomyelitic abscesses, and in eight cases obtained the orange-colored micrococcus; in one case, however, he obtained two kinds, one yielding an orange, the other a white growth; but in this latter case the abscess had broken through the skin. The same orange-colored organisms were also found in the effusions in the joints. Cultures in sterilized milk resulted in the coagulation and fermentation of the milk.

¹ Referred to in an editorial of the *Fortschritte der Medicin*, Vol. I, beil. 209, but not otherwise published.

² "Ueber einen bei der acut. infec. Osteomyelitis des Menschen vorkommenden Micrococcus." *Fortschr. der Med.* Vol. II. 1884. P. 221.

For injections he used the liquefied gelatine of at least a sixth generation diluted one-half with sterilized water. Larger quantities injected into the abdomen caused peritonitis. Intra-venous injections were performed upon eighteen rabbits and seven guinea pigs, both with and without preceding injuries to the bones; localization in the joints resulted, and foci in the kidneys were always present. In seven out of fifteen cases abscess occurred at the seat of fracture, and in these cases the pus again yielded pure cultures. On the other hand putrid substances failed to produce suppuration of the bone-marrow, though they caused abscesses; neither could the peculiar orange-colored micrococcus be obtained from these latter abscesses by culture experiments,

Krause, however, concludes, in opposition to Becker, that the analogy existing between these experiments and the acute osteomyelitis occurring in man is imperfect and that the whole affection is quite a different one in each case, the artificial infection more closely resembling pyæmia.. He concedes, however, that the described micrococcus is highly pathogenic in character and of great vitality.

Krause, furthermore, found the same orange-colored micro-organisms in three cases of carbuncle of the neck in man, and with it was able to produce the same joint and kidney affections in five rabbits and two guinea pigs, which he injected with it, as in his experiments with the first-mentioned micrococcus, and in one case out of five, in which he had previously caused subcutaneous fracture of a bone, he even obtained an abscess at the seat of the fracture, and purulent infiltration of the bone-marrow. In other suppurations in man, however, he did not find the orange colored coccus.

This is of some interest, as Pasteur (as Rosenbach remarks) had previously identified the micrococci of carbuncle with those of osteomyelitis, and Garré subsequently, as will be mentioned further on, was led to the same conclusion.

The subject, however, owes its present aspect principally to Rosenbach's later observations and experiments.

This author published a note early in the year 1884,¹ anticipating his

¹ "Vorläufige Mittheilung über die die acute Osteomyelitis des Menschen erzeugenden Micro-organismen." *Centralbl. für Chir.* 1884. P. 65.

later communications,¹ in which he again called attention to the fact that he had been able to obtain affections resembling acute osteomyelitis, even to the necrosis of bone, by injecting the organisms of lactic fermentation and others into the animal system, but only after injuries done to the bone, and reminded his readers that Kocher had had similar results with putrid matter. These experiments now appeared in a different light. For, on the other hand, he had, more recently, been able, with the help of Koch's methods, to obtain cultivations of the orange-colored micrococcus from all manner of suppurative inflammations. He cultivated it seventeen times out of thirty-five unopened abscesses; he found it twice in five cases of empyema, twice in two cases of furunculus, three times in five cases of pyæmia, and twice in four septic affections.

He, moreover, examined fifteen cases of osteomyelitis, and found the orange-colored micro-organism fourteen times; twelve times this alone was present, once a coccus growing as torula, and once a white micrococcus was found as well, which he names *streptococcus pyogenes* and *staphylococcus pyogenes albus* respectively. In one case of osteomyelitis only the latter was found, and not the orange-colored one at all.

Injections made with either of the micro-organisms found always resulted in phlegmons and abscesses. Rosenbach therefore concluded that the so-called specific micrococcus of osteomyelitis was nothing else than one of the eight kinds of organisms which he had found in common pus.

He gives the description of the three kinds of organisms found in osteomyelitis in the following manner, the first one here mentioned being Becker's osteomyelitis-micrococcus:

Staphylococcus pyogenes aureus—Grows on Japanese isinglass-soil prepared with infusion of meat and peptonized, at a temperature of 30° to 37° C. In twenty-four hours slide-cultures show slightly opaque, at first light-yellowish, later on more marked orange-colored lines, which subsequently grow broader, though not deeper, and show lateral facets. Microscopically examined the lines consist of rows of

¹ "Micro-organismen bei den Wundinfektions Krankheiten des Menschen." Wiesbaden. 1884.

very small absolutely spherical micrococci, lying closely together. Their effect on rabbits is deleterious. They do not possess putrefactive action.

Staphylococcus pyogenes albus—Grows on the same soil luxuriously in opaque white colonies. Microscopically these are not to be distinguished from the former.

Streptococcus pyogenes—Grows slowly on peptonized infusion-of-meat-gelatine-soils in the form of whitish, somewhat opaque, round points, resembling particles of sand. On infusion-of-meat-soils prepared with agar-agar and peptonized, the organism grows more rapidly in round dots resembling pins' heads. In their further development the colonies appear higher in the centre, and here of a brownish color, growing lower towards the periphery and rising again at the outer edge, so as to form a thick, wavy, spotted marginal ridge. Viewed through the microscope they resemble Fehleisen's specific micrococci of erysipelas. Rosenbach's later publications are the same in substance, although detailed at greater length, while a later communication of Becker has not appeared.

The latest publication on this subject is by Garré of Bâle, who found both the yellow and the white varieties of micrococci in osteomyelitic pus, cultivating them on 3 per cent peptonized gelatine with infusion of meat, on 1 per cent agar-agar and on blood-serum soils.

He was also able to obtain cultures of these same two varieties from the blood of three of the patients, two of whom had passed the acute stage of the disease.

He therefore believes that these micro-organisms course in the blood as long as fever is present.

According to this author there is, therefore, at present, little doubt but that the two varieties of micrococci, the *staphylococcus pyogenes aureus* and *albus*, play an active part in the causation of acute osteomyelitis, although he allows that, until it can be proved that these micro-organisms occasion acute osteomyelitis in man, and without previous injury to bones, some obscurity must attach to the etiology of the disease, and particularly to the manner in which the infectious agents enter the system.

On the other hand it is proved, as far as the present state of bac-

terial science goes, that there is no specific osteomyelitic micro-organism other than those found in a number of other inflammatory processes connected with suppuration, viz., the *staphylococcus pyogenes*.

In order to satisfy himself that the micro-organisms of osteomyelitis possessed the same action as those other ones found in phlegmons, the author inoculated himself with pure cultures obtained from his osteomyelitis cases. Twice he introduced small quantities of culture-gelatine into cuts made for the purpose in his finger, and also applied a large quantity to the healthy skin of his arm by inunction. The first experiments resulted in slight phlegmonous inflammations; the latter procedure, however, caused a large and painful carbuncle of three weeks' duration. In these experiments, too, the pus again yielded pure cultures of the original form of micrococcus, *staph. pyog. aur.*

More recently Passet has succeeded in differentiating three distinct varieties of the *staphylococcus*, which differ mainly in the color of the colonies, and which he terms respectively, *aureus*, *albus* and *citreus*. But whether the latter is present in the pus formed in acute osteomyelitis has not yet been investigated.

W. W. VAN ARSDALE.

ON TRANSFUSION AND REINFUSION OF BLOOD.

The recent practical communication by Dr. John Duncan, of Edinburgh, in the British Medical Journal, of Jan. 30, 1886, on the subject of Reinfusion of Blood in Primary and other Amputations, is deserving of careful consideration. Notwithstanding the positive statements of some (Bergmann, 1883; Mikulicz, 1884) that all that can be effected by the operation of transfusion of blood can be accomplished by the simpler means of infusing into the veins a solution of common salt, upon the hypothesis that what was required was to fill the elastic tubes of the vascular system with a certain amount of fluid, not necessarily blood, nevertheless the experience of many observers accords with the opinion expressed by Duncan, that the benefit from these saline injections is but temporary. For a time the conclusions of Köhler as to the dangers of ferment intoxication resulting from transfusions of defibrinated blood, strongly indorsed by Bergmann, have nevertheless

tended to popularize the use of saline infusions. Said the latter surgeon in an address at the opening of the Academy of Military Surgery (Berlin, 1883):

“ When defibrinated blood is transfused, the fibrino-plastic element and the fibrine ferment find themselves free, and in this state they tend to cause coagulation of the moving contents of the blood-vessels. To some extent the organism protects itself against this tendency to coagulation, and within certain limits is able to resist its effects, but if the quantity of the injected fluid be great, coagulation will take place. Köhler's experiments have proved still more. Everything which destroys the blood corpuscles in the blood-vessels and sets their contents free produces a vital ferment in the blood. This causes two things: first, extensive further dissolution and decomposition of the blood corpuscles and coagulation of the blood; and, second, smaller disturbances—a certain amount of disorganization of the blood—with which, however, the organism can still go on, and which it may overcome, but only amidst symptoms of a definite form of illness, those complex symptoms which Magendie has described as typical of transfusion with defibrinated blood, which Panum describes as typical of foreign blood, and which Köhler calls ‘ferment-intoxication.’ ”

Heineke (1885) however, declares that, “ although transfusion with some kinds of defibrinated blood may induce ‘ferment-intoxication,’ yet it only occurs in rare cases under exceptional circumstances, and that careful transfusion with defibrinated human blood may be considered upon the whole as free from danger, provided not too large an amount of blood is injected at one time—at most not more than from 150 to 200 grams.” The present proposition, and already many times repeated practice of Duncan, is to use neither saline solution nor defibrinated blood, but fresh blood, whose coagulation is retarded by the admixture of a certain proportion of phosphate of soda. In cases of primary amputations for injury, and in the major amputations for disease performed upon wasted and anæmic patients, he catches the blood unavoidably lost and reinjects it into the vascular system of the patient through the main vein which is exposed upon the surface of the stump. In such cases, one of them an amputation at the hip, he reports that he has already done this in a sufficient number of in-

stances to enable him to speak with confidence as to the safety and value of the procedure. The idea, he states, occurred to him in the course of considerable experience in ordinary transfusion. A colleague having had under his care a case of pernicious anæmia, in which the decadence was so rapid that the end could not be postponed many weeks, and having come to the conclusion that it would be right to try transfusion of blood, consulted him on the subject. Having himself tried, or seen tried by others, most of the instruments hitherto in use for direct transfusion, he had arrived at the opinion that all were unsatisfactory, either from the risk attending them, or from liability to failure in attaining the desired end. It appeared to him, therefore, that it was necessary to adopt the method of defibrination, or to delay the coagulation of the blood by some of the saline additions which have already been used for the purpose, in order that a sufficient quantity might be injected with sufficient slowness.

In making inquiry as to the experience of others, he was informed by his colleague, Dr. Cotterill, that he had on one occasion performed transfusion of blood mingled with phosphate of soda, as recommended by Dr. Pavy, and that the immediate result of the operation had been all that could be desired. As the power of phosphate of soda to delay coagulation is undoubted, he determined to adopt a plan whose feasibility was thus assured.

Without going into the history of the pernicious anæmia, it suffices to say that, by four transfusions, the quantity of the red corpuscles and hæmoglobin was trebled, and that the improvement has been maintained for two months without further operation.

In another instance he had operated in a case of empyema by resection of portions of seven ribs. A certain amount of blood was unavoidably lost during the operation, and through the night slow oozing took place into the thoracic cavity, making little show outside the dressings. Next day the patient seemed moribund; and, in the absence of the operator, his house surgeon, Dr. Carmichael, had himself bled to six ounces, and injected that quantity with phosphate solution into the patient's veins. The man immediately rallied, and is now quite well.

An operation of this kind plainly requires attention to detail, but its

extreme simplicity renders easy the avoidance of mistakes. Much importance is to be attached to the perfect fluidity of the blood, and the aseptic condition of all the instruments. In no case had any patient the slightest fever, rigor, or disturbance of any sort subsequent to the operation. Glass was purified by prolonged immersion in a solution of bichloride of mercury, metal in carbolic acid.

For introduction into the vein of the receiver, a short glass-tube, of the size of a No. 6 catheter, having a pen-shaped point, was used. To its other end, made slightly bulbous, about two inches of India-rubber tubing is attached. A simple glass syringe, holding four ounces, whose nozzle fits the tubing, is perfectly effective. The temperature may be kept up by surrounding it with boric lint, wrung out of hot water. A graduated glass vessel, kept floating in warm water, contains the solution of phosphate of soda, and receives the blood.

All are washed with aseptic water after removal from the antiseptic solution, and before being used.

In amputations, the most convenient vein is selected on the face of the stump, the glass point is inserted, and a catgut ligature put round it. While the process of ligaturing the arteries is going on, the blood is caught by one assistant, who adds the soda-solution as required, and is slowly injected by another. There is no time wasted, and the amount put into the circulation is precisely proportioned to what the patient would otherwise have lost, *plus* what amount of saline solution the surgeon may think right and appropriate to the case.

In the case of pernicious anæmia to which reference has been made, a vein in the arm of the blood-receiver was exposed, and under it a double thread of catgut was passed. The blood was then drawn from the donor into the dish containing the phosphate of soda, with which it was gently mixed by means of a glass rod. While an assistant filled the syringe, the exposed vein of the receiver was opened, the lower thread of catgut being gently pulled upon to prevent bleeding. The tube was then inserted, the upper thread tied round it with one knot, and the lower definitely secured and cut short. The blood was next slowly injected, the India-rubber tubing being pinched when the syringe required to be refilled. The upper catgut was finally tied and cut short when the operation was completed, and the little wound was stitched up.

There is a limit to the rate of injection on each side. One may possibly take longer to inject than the blood will remain fluid, or one may inject too rapidly for the comfort of the patient. In amputation neither of these can easily happen; but in this case the reporter believes that he committed both errors. This point of course involves the question as to how much phosphate of soda ought to be added, and as to the coagulating quality of the blood. The solution of phosphate of soda was of 5 per cent, and one part of the solution was added to three parts of blood. A slightly larger proportion is probably advisable, and was frequently used in the amputation cases.

Experience shows that, with sufficient phosphate of soda, one may occupy at least twenty or thirty minutes in injecting; and that at a slow rate the patient will experience not the least discomfort. At the same time the effect will vary with the condition of the patient. In one amputation eight ounces were injected in five minutes; in the hip sixteen ounces in about fifteen minutes, without any disturbance. The more complete and rapid depletion has been, the more quickly and largely may repletion be effected.

The reporter concludes with one other observation, viz., that the process of reinjecting the patient's own blood is incompatible with the use of spray or irrigation during the operation. For himself he is satisfied by experiment and from clinical experience that the spray does not kill micro-organisms in the air, and that in most cases the application of the germicide may safely be delayed till near the end of the operation. With pure hands and instruments, the risk from the air is trifling, and it is not worth considering when a patient is in imminent danger from hæmorrhage and collapse.

L. S. PILCHER.

LACTIC ACID AS A DESTROYER OF PATHOGENIC TISSUES.

Since Mosetig-Moorhof's favorable results with this agent (*Centbl. f. Chirg.*, 1885, No. 12) various other observers have made use of it, in lupus, superficial epithelioma, papillomatous growths, fungous processes, scrofular ulcerations, laryngeal phthisis, etc. Its advocates claim that it is not a true caustic, but selects diseased and spares healthy tissue. Wherever its application is practicable it is consequently to be preferred to curetting.

The acid is a syrupy liquid miscible with water. Though not considered necessary by some, its action may be confined by covering surrounding parts with plasters, collodium or traumaticin; fats are an impediment. It is applied on linen, felt, or the like, either pure or reduced with water, or mixed as a paste with pure pulverized silicic acid. It may be applied with a brush, but does not then act as rapidly. It is further recommended to bind it on with rubber, paper, or other confining material. It causes considerable pain for a few hours (Bum says 1-3) and is usually removed in twenty-four or less.

Joseph (*Deut. Med. Woch.*, 1885, No. 43) cured a leucoplakia buccalis with 80% diluted lactic acid. Schnitzler reported at the September *Naturforscher-Versammlung* his experience with it—not very favorable—in tuberculosis of the larynx. Krause, of Berlin has also used it in this affection, and Jellinek (*Wien. Med. Wochenschrift*, 1885, No. 46), in Schrötter's clinic, has for some months given it a more thorough trial. For this purpose he prefers a 20 to 80% solution. The healthy mucous membrane is but slightly affected, while infiltrated portions are slowly destroyed. The more succulent the infiltration, the more vigorous the action; cedematous parts shrink in three or four days, and troubles in deglutition are rapidly relieved. Most favorably affected were small ulcerations, especially on the vocal cords; larger sores were only prevented from further growth. In ulcerous, granular and hypertrophic pharyngitis he had good results. In nasal troubles simple brushing does not suffice; longer contact is necessary. J. believes that in laryngeal phthisis by daily applications more can be

accomplished with this than with any other remedy, and that in its earlier stages it can thus be cured.

Bum (*Wien. Med. Wochenschrift*, 1885, No. 47) has for several months been employing it in fungous, i. e., tubercular disease of soft parts—skin, subcutaneous tissue, lymphatic glands—in dispensary practice. The unhealthy granulations are reduced to an easily reducible pulp; the walls of the cavity do not bleed; after two or three applications, with intermediary pauses of two days, a permanent dressing of iodoform gauze is used, abundant healthy granulations develop, and a smooth, soft scar results. Lactic acid will attack healthy as well as unhealthy epidermis, but in the subdermal tissues it seeks out fungous nests and destroys them. B. gives short histories of nineteen cases in patients from 1 to 52 years of age. There were eight males and eleven females; eight ulcers, seven fungous and four fistulous. The average number of acid dressings was three, and the average time of cure twenty-five days, or, deducting one who removed dressings, but nineteen and eight-tenths days. No failures, and up to date, six weeks to five months later, no relapse.

Finally Mosetig has returned to the subject again (*Wien. Med. Wochenschrift*, 1885, No. 48), with the demonstration of good results in a large facial epithelioma in a man æt. 55, and an ulcer rodens on the face in a woman æt. 60. In the former he had made twenty-six application in a month, and in the latter he had made twenty already. In caries he finds it excellent, good demarcation being produced, and there being less liability to relapse than after curetting. He has tried injections of the acid, $\frac{1}{2}$ to 1 grm. of a 50 to 70% solution. Whether relapses may yet occur he, of course, cannot say.

W. BROWNING.

INDEX OF SURGICAL PROGRESS.

NERVOUS AND VASCULAR SYSTEMS.

I. On the Operative Treatment of Loss of Substance in Peripheral Nerves. By Dr. H. TILLMANN (Leipzig) Of course the various methods of overcoming such a loss in continuity are first examined (vide ANNALS I, p. 132, II p. 181). Operative treatment of these nerve defects has been proposed in no less than six ways: 1. Transplantation into the defect of a bit of nerve from the same or some other animal species. 2. Union of the peripheral stump with some neighboring uninjured nerve (*greffe nerveuse*). 3. Crossed splicing, when there are defects in two neighboring nerves, but not at the same level, even union of the shorter to the longer central stump may be made. 4. Formation of pediculated nerve-flaps, either a single central flap or one from both stumps. 5. Interposition of a decalcinated bone tube. (Under the same head falls the proposition to unite the ends by strands of catgut, hoping thus to direct regeneration). 6. Subperiosteal exsection of a piece from the bony continuity of the corresponding extremity, with subsequent suture of the nerve stumps. A matter of great importance in all these methods is their preventing the interpolation of connective tissue between the nerve stumps.

T.'s case was that of a woman *æt.* 23. Scythe cut of volar side of fore-arm about three finger breadths above the fold of the wrist. It healed—no medical care—under suppuration, a paralysis of the hand remaining. This affected the ulnar and median nerves. Atrophy with claw-hand developed. Electrical examination confirmed the extent of paralysis.

Operation four months after injury. It was found impossible to make the nerve stumps meet. A flap was made from each stump of both nerves and connection thus effected. Sutures also of the severed

overlying tendons. Sensation began to return in four weeks. Slight active motility discovered nine weeks after the operation. At the end of a year she wrote with the hand and had nearly perfect use of it; numbness only at the tips of the middle and ring fingers. Of course electricity and massage formed the early part of the after-treatment.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. IV.

W. BROWNING (Brooklyn).

II. Common Carotid Artery Wounded by a Fish Bone Through Pharynx. By WALTER RIVINGTON, M.S., (London). The patient, æt. 9, was admitted into the London Hospital with a history of having swallowed, six days previously, a plaice-bone. A probang was passed without causing relief. On admission the symptoms were pyrexia, stiffness of the neck, œdema of the upper lids, profuse salivation and a small, tender lump on the left side opposite the cucoid cartilage. Drowsiness supervened, and inability to swallow solid food. Hæmorrhage occurred from the mouth on three occasions, the last being profuse. The left carotid was cut down upon and tied above and below the seat of injury. The operation was difficult, owing especially to inflammatory adhesions and uniform staining of all structures, including nerves and blood vessels. The fish bone was found in the centre of a clot. The patient lived ten days after the operation, dying from abscess of the brain on the left side, which had probably begun to form before the operation. The author remarked upon the mischief which was often wrought by the incautious passage of bougies and probangs in these cases. For treatment he advised improved illumination of the pharynx and œsophagus, and extraction of the foreign body with forceps; regulation of diet, administration of demulcents, and cautious use of the expanding probang. Œsophagotomy must be considered in some cases, but the peril in which life is placed by the occurrence of hæmorrhage renders prompt surgical interference imperative in all.—*Brit. Med. Jour.* 1885. Oct. 31. P. 832.

H. PERCY DUNN (London).

HEAD AND NECK.

I. Two Cases of Angina Ludovici. By Mr. ARTHUR BARKER. These two cases of the above disease are of considerable interest. The first is that of a lad *æt.* 18. Onset sudden. Caught cold, followed by toothache on right side. Swelling appeared on right side, extending to left side. On admittance to hospital patient was extremely ill; great fulness underneath chin and on both sides of neck, extending round the angles of the jaw. Swelling was brawny, with great prominence on floor of mouth. Could only swallow liquids. Breathing embarrassed. Fluctuation indistinct. An incision was made in middle line and dilated and deepened by sinus forceps. Only a drachm of thin, ichorous, extremely foul sero-pus came out. Foul pus continued to be discharged, and he developed some basic pneumonia, but ultimately did well.

The second a single woman, *æt.* 25. Considerable swelling and induration of neck in front and on each side, extending on the right side as far as the posterior border of sterno-mastoid, and on the left as far as the anterior border; upwards on the right side as far as the eye, causing oedema of the lids; downwards as far as the clavicle on each side. Floor of mouth very little swollen. Distinct blush over whole of swelling. No fluctuation. A deep incision was made in median line below chin, but no pus appeared. A fluctuating swelling appeared below this incision, which was opened, and pus discharged. Several other incisions were necessary from time to time, but patient ultimately recovered. Mr. Barker remarked on the prevalence of cellulitis about this time, and drew attention to the most common features of the disease, viz., debility at the time disease was contracted; a damaged spot in cavity of mouth suggesting inoculation of a specific virus; rapid extension of swelling, extreme hardness; presence of this brawniness some time before the appearance of pus; thin ichorus, dirty nature of the fluid evacuated; high temperature during spread of disease; great depression and peculiar duskiness of skin combined with pallor; beneficial effects of early incision; free stimulation.—*Lancet*, 1885, Sept. 26.

H. H. TAYLOR (London).

II. Resection of Sup. Maxillary and Inferior Dental Nerves for Neuralgia. By Dr. W. T. BULL (New York). A night watchman, æt. 62, was admitted to the New York Hospital July 29, 1882. For several years he had had at intervals some pain in the right side of the face, which within a year had become more severe and almost continuous. He was rheumatic, had not had syphilis, and the history of malarial disease was doubtful. All sorts of medical treatment had been resorted to, and many teeth in both the upper and lower jaw had been extracted. When admitted he was suffering from the same pain, which was partly controlled by hypodermic injections of morphine. There were tender points over the infra-orbital and mental foramina, and over the condyle of the jaw. He was slightly emaciated, and could not eat solid food, and also had pain in talking.

August 11, 1884.—The superior maxillary was exposed in the floor of the orbit and three-fourths of an inch removed. The artery was divided and bled sharply. It was stopped with a plug of catgut which was continuous, with a few strands emerging from the centre of the wound. Peat and bichloride dressing were applied. The wound healed primarily in four days. One week later the inferior dental nerve was exposed by a vertical incision over the ramus of the jaw and by chiseling through the outer wall of its canal (Warren's operation). The incision was placed low enough to avoid Steno's duct; the fibres of the masseter, with the periosteum, were raised with the elevator, and the upper angle of the wound was strongly retracted. It was a narrow wound to work in, but there was little difficulty in removing a rectangular piece of bone, one-fourth by three-fourths of an inch in area. Three-quarters of an inch of the nerve were removed. In separating it from the artery the latter was wounded and tied with catgut. A small bone-drain was left in the wound, which was treated like the other. At the end of a week, when the dressing was removed, the wound was healed except at the orifice of the tube, and this closed promptly under an iodoform scab.

From the time of the operation the man experienced no pain whatever in the face, and there was complete anæsthesia over the areas supplied by the nerves. There was no facial paralysis. Now, fifteen months after the operation, he continued perfectly well. There had

been a dull aching in the lower jaw in damp weather, but it was trifling in degree, and did not increase in either frequency or severity.

There is complete anæsthesia on the right side of the face over an area included between two lines running from the outer and inner angles of the orbit downward to the line of the chin. It does not reach far back on the cheek, or much under the chin. It does not reach the lower palpebral margin, nor *quite* to the median line on the nose. In the lips and chin it extends *exactly* to the median line. It involves the gums and what teeth there are in the lower jaw on the right side up to the median line. At the outer, upper and nasal borders of the area the anæsthesia shades off into normal perception. On the lips and chin the anæsthesia is complete up to the median line, and the transition to normal sensibility is sudden. There is no anæsthesia of the palpebral conjunctiva of the right lower lid or the right internal canthus, or the gums of the upper jaw, or the tongue. There is no paralysis of any facial muscle. He has complained of his sight being weak since the operation. The fundus is normal and the vision good, but with the prism-test an insufficiency of the interni is revealed (probably the right) of 5° for distant vision and 12° for near vision, and he reads much better with a prism to correct that.—*Proceedings N. Y. Surg. Soc.*, 1885, Nov. 10.

III. Stricture of the Œsophagus: Permanent Relief through Internal Œsophagotomy. By Dr. H. B. SANDS (New York). A woman, æt. 21, has a stricture of the œsophagus, seven inches from the incisor teeth, the result of the accidental swallowing of a solution of caustic potash when æt. 2. By gradual dilatation its calibre had been enlarged until a No. 23 French catheter would pass, but more than this the operator was unable to accomplish. Therefore, on the 9th of July, 1884, he introduced an œsophagotome, passed the bulb beyond the stricture, projected the blade 2.5 mm., and then withdrew it, making an incision in the posterior median line of the œsophagus. Immediately after the operation, which was performed without an anæsthetic and was attended by no hæmorrhage, he passed a No. 29 (French) bougie. Subsequently he carried the dilatation up to No. 34 (French). After the cutting operation, instruments were at first passed

every second or third day, and during the summer and autumn at intervals of three weeks. In December the interval between the introductions of the bougies was increased to one month, after the 1st of January to two months, and now there had been an interval of three months, without any diminution in the calibre of the œsophagus at the point where it had been divided. Soon after the operation, exploration of the œsophagus revealed the presence of another stricture, ten inches from the incisor teeth, which admitted a No. 24 (French). This was dilated up to 29, but beyond this he had been unable to dilate it.

The history of this patient may correct the common impression that all strictures of the œsophagus exhibit an invincible tendency to recontraction, and that the operation of internal division is unsatisfactory, because not likely to produce any permanent good result. In the case of a child upon whom he had performed several operations of internal œsophagotomy several years ago, for the relief of a stricture of the œsophagus, and in which instance dilatation was carried up to No. 29, the child improved in health, was able to eat solid food, and had remained well ever since. At the present time she swallowed as well as other children, yet no bougie had been passed for five months. These cases demonstrate that internal œsophagotomy may sometimes produce results which are permanent; and that, although the œsophagus may not be restored to its normal dimensions, it does not necessarily tend to contract below such dimensions as would permit of easy deglutition. The first patient referred to was now in good health, had increased in weight from ninety-six to 109 pounds, and was able to swallow liquids without difficulty, and, with care, to swallow solids when well masticated.

Strictures of the œsophagus closely resembled strictures of the urethra, in which there were found every grade of constriction and also a vast difference in the amount of tissue which caused them. In many cases strictures are limited to a very short part of the canal, and in those cases internal œsophagotomy would be likely to be followed by the greatest relief with a minimum amount of risk.—*Proceedings N. Y. Surg. Soc.* 1885, Oct. 27.

CHEST AND ABDOMEN.

I. Painful Mammæ in Young Girls. By I. H. MORGAN (London). The author states that he has had several cases of this painful affection of the mamma brought to his notice. The ages of the girls varied from $10\frac{1}{2}$ to 12 years, and most were tall and well formed. In five of the cases the left breast only was affected, in one case the right, and in another both breasts consecutively were the seat of pain. Believing that the tendency of the left mamma to become frequently affected was owing to the pressure of the chest against the desk while writing, he prohibited his patients from writing, but in none of them did the pain cease for many weeks after they had been kept from school. Although the cases were under observation for many weeks neither local nor general treatment was of much avail. The pain first became intermittent and then subsequently ceased. He thinks that the absence of any great heat, redness or swelling puts inflammatory conditions out of the question, and the age of the patient, the obstinate and chronic character of the pain, together with the slight enlargement of the gland and its extreme tenderness on pressure, would seem to point to some developmental change in the structure of the gland, which accompanies, or may even precede, the changes which are doubtless commencing about that period of life in the ovaries and organs of generation with which the mamma has so many sympathies.—*Brit. Med. Jour.* 1885. Oct. 17.

II. The Treatment of Pulmonary Cysts by the Establishment of Large Openings into the Sac, and Subsequent Free Drainage. By JOHN DAVIS THOMAS, M.D., (Adelaide, S. Australia). The author advocates in this paper the treatment of pulmonary cysts by surgical interference. From various sources he has collected the histories of thirty-two cases in which large openings have been made into cavities in the lungs in order to permit the escape of the mother cyst and any daughter cysts that might be present, and of these cases twenty-seven recovered and five died. The disease was met with at various ages, from one year upwards. The right lung was affected in nineteen cases and the left in five; in eight the side is not mentioned. Having accurately determined the position of the cyst containing cav-

ity, a free incision over its most superficial part is made down to the intercostal muscles. These latter are cautiously divided, and the scalpel is then pushed deeply into the cavity. A large trocar and canula may be used instead of the knife to perforate the cavity; in this way there is less risk of hæmorrhage from the wall of the sac. The opening into the sac is dilated to the necessary size by means of forceps. When the cyst is a large one, it may be necessary to make an opening large enough to admit the index finger, in order to permit expulsion of the contents. No injections are advisable after the operation, because the fluid by entering the bronchial tubes of the cavity is apt to cause violent cough. A large drainage tube of India rubber should be inserted and maintained in situ until the secretion of the discharge by the walls of the cavity has almost ceased. The dressing preferred by the author is a thick and large pad of picked oakum, enclosed in antiseptic gauze.—*Brit. Med. Jour.* 1885. Oct. 10.

III. Enterectomy for Acute Intussusception. By A. W. MAYO ROBSON (Leeds). The patient, a woman æt. 33, had enjoyed good health up to the time of pregnancy, which began about three months before admission into the Infirmary. Since pregnancy she had incessantly vomited after food. For seven days no action of the bowels had taken place, and the vomiting had suddenly increased in severity. On examination the abdomen was distended and rather tense. Two swellings could be felt, one to the right of the umbilicus, the other above the pubes. They were ill-defined, tender on pressure, and caused vomiting when handled. The vomiting was stercoraceous. Nothing was to be felt per rectum or per vaginam. Laparotomy was performed on day of admission. The incision, a median one, having been made, the tumor was soon reached and proved to be a large intussusception. After considerable difficulty the intussusception was relieved, but the invaginated bowel was to the extent of four feet found to be gangrenous. A ligature was passed through the mesentery of the sound intestine above and below the diseased region, and tied round the bowel just sufficiently tight to prevent escape of the contents of the alimentary tract; the diseased mesentery was then tied in about twenty portions, and the whole of the gangrenous bowel and mesen-

tery removed. The sound mesentery was then on both sides joined by interrupted sutures and the ends of the bowel were put in apposition and united by union of fine silk sutures placed close together, passed through the whole thickness of the bowel and tied inside, except the last two, of which the knots were placed outside. In addition a series of Lembert's sutures were applied, in order to secure a broad apposition of peritoneal surfaces. The operation lasted two hours. Death took place from shock a few hours afterwards. At the post-mortem the situation of the sutured bowel was found to be 4 feet 2 inches from the commencement of the duodenum. The bowel was practically water-tight and the mesentery accurately sutured. There was no trace of peritonitis.—*Brit. Med. Jour.* 1885. Oct. 3.

IV. Two Cases of Pelvic Hæmorrhage after Abdominal Section. By JOHN W. TAYLOR (Birmingham). The first case was one in which the appendages on both sides had been removed by Mr. Lawson Tait. The pedicles had been tied with silk and the abdomen completely closed. In a few hours time the patient exhibited unmistakable symptoms of hæmorrhage. The abdomen was reopened and a quantity of venous blood was found filling the pelvis and extending for some distance among the viscera in the general abdominal cavity. The hæmorrhage was taking place from the right stump, some portion of the tissues of which appeared to have slipped out of the ligature. A fresh ligature was applied. The bleeding still continued a little, apparently from a point low down behind the uterus. A sponge was dipped in a weak solution of perchloride of iron and pressed down into Douglas's pouch and kept there while the sutures to the abdominal incision were being applied. It was withdrawn just before the sutures were tied and a large drainage tube inserted in its place. No subsequent hæmorrhage occurred, and the patient recovered. In the second case, the appendages on the right side had been removed and on the left neither ovary nor tube was distinguishable, although their supposed site was freely opened up by the fingers. From this situation considerable hæmorrhage occurred at the time of operation. It was controlled by sponge pressure and a drainage tube was left in the pelvis on closing the abdominal wound. Some hours afterwards the patient

was pulseless from blood which had flowed through the drainage tube. The abdomen was reopened and the bleeding found to be taking place from a somewhat ragged depression on the left side. A piece of solid perchloride of iron the size of a Wyeth tablet was pressed well into the cleft, the parts around having been previously made as dry as possible; the drainage tube was then replaced and the abdomen closed. The hæmorrhage soon ceased, the patient making a good recovery. The case was one operated on by Dr. Savage.—*Lancet*. 1885. Dec. 26.

H. PERCY DUNN (London).

V. On the Genesis of Certain Cases of Inguino-Interstitial Hernia and Inguino-Perititoneal Hernia. By Dr. M. SCHMIDT (Cuxhaven). S. became convinced by an observed case that the first form (Goyrand's) and the second (Kröunlein's) have a related and heretofore unrecognized cause.

His case was in a man æt. 20. On the right the testicle had always been wanting. No hernia up to a year previous. While straining at work he first noticed a tumor appear on his abdomen. On sitting down he reduced by gentle pressure. Nearly a year later it developed again over the right groin, but did not go back soon. Operation. The internal inguinal ring was found dislocated backwards and inwards with all its anatomical appurtenances. Through this passed a hernial sack, at the bottom of which was the right testicle, about one-third its normal size.

The assumption that this displacement was congenital explains the various facts well. The higher point of entrance of the processus vaginalis increased the length of the inguinal canal. This would not allow its ordinary length of growth to reach through the external ring into the scrotum, hence the testicle did not complete its descent. The smallness of the external ring he does not use to explain the retention of testicle, as did Goyrand, but rather believes it to be due to the non-perforation of the obliquus-aponeurosis by the vaginal process and testicle.

After considerable discussion, in part of other mostly negative cases, he formulates his conclusions thus:

1. In Goyrand's hernia inguino-interstitialis an external inguinal ring

may be found congenitally dislocated upwards and outwards, the existence of which readily explains the characteristic of this hernia, as also the frequently accompanying narrowness of the external ring and the retention of the testicle in the canal.

2. In many cases of Krönlein's hernia inguino-properitonealis the significance of the so-called common abdominal ostium of the hernial sack as a congenitally dislocated internal inguinal ring, appears to be irrefutable by any valid reasons. With this significance a simple explanation presents itself of the construction of the sack characterizing the hernia and of the frequently accompanying incomplete descent of the testicle.

3. To explain the origin of a congenitally dislocated internal inguinal ring, the assumption lies near at hand of a defective variation in the insertion of the inguinal cord of the primordial kidney in the abdominal wall.—*Arch. f. klin. Chirg.* 1885. Bd. 32, Hft. IV.

W. BROWNING (Brooklyn).

VI. The Indications for Laparotomy in Penetrating Stab or Shot Wounds of the Abdomen. Prof. STEPHEN SMITH, the chairman, in the surgical section of the New York Academy of Medicine, remarked on the frequency of these injuries and the importance of the question of the propriety of operative interference, and referred to the fact that explorative laparotomy, with proper precautions, had come to be considered as by no means as formidable an operation as formerly, which, if true, removed one of the great obstacles to the successful treatment of these wounds.

Prof. J. D. BRYANT did not think that laparotomy should be performed in all cases immediately after the accident, and that it should not be attempted even in so-called favorable cases unless the operator could avail himself of many of the recognized means of procedure necessary to combat the shock of the operation, and was sufficiently familiar with the operation to act with accuracy and rapidity. He did not consider that the explorative incision exposed the patient to unusual danger. The points to be considered in a case of penetrating abdominal wound, and not as prominent in ordinary laparotomy, are, (1) doubt as to injury of the abdominal viscera, (2) shock arising in

the great majority of cases from loss of blood, in which case the hæmorrhage should be checked at once, (3) unfavorable surroundings, (4) unskilled operators, (5) greater exposure of the abdominal cavity and its contents in the painstaking examination necessary, in which not time, but care and completeness only, should be considered, (6) hæmorrhage, a suspicion of which is sufficient to indicate an exploratory incision, (7) extravasation of intestinal contents, which constitutes the strongest indication for laparotomy, and (8) the greater difficulty of cleansing the abdominal cavity and contents, the thorough performance of which appears to be the only means of saving life.

Prof. R. F. WEIR remarked that a more expectant plan of treatment could be pursued with respect to stab than shot-wounds, since the lesser impetus of the knife would be more likely to allow the intestines to escape. Reference was made to the fact that the wounds of the intestine were usually multiple. Referring to the danger of hæmorrhage, he suggests the introduction of a sponge, attached to a stick, through an incision in the median line or the wound enlarged, to determine whether such a condition exists or not. He was strongly in favor of laparotomy in treating gunshot wounds of the abdomen when the general condition of the patient warranted it.

Prof. W. M. POLK, speaking of laparotomy from a gynæcological standpoint, considered the increased percentage of recovery in laparotomy to be due to smaller incisions, the less handling of the peritoneum, and greater operative dexterity, by which shock and peritonitis were avoided to a greater extent.

Prof. A. C. POST noticed the difference in the danger of abdominal wounds depending upon the differences of locality, the greater danger of fæcal extravasation in wounds in the umbilical than in the epigastric or hypogastric zones, and the less danger of wounds of the stomach than of the intestine. He related a case of wound of the epigastric region with protrusion of the omentum, treated successfully by rest and starvation. He mentioned a case of persistent fæcal fistula resulting from an attempted introduction of an aspirator needle into the urinary bladder, and detailed a case in which a man received a shot-wound of the lower part of the abdomen, where a greatly distended bladder received the impact, saving the bowels, the patient recovering without

any very formidable symptoms. He considered that laparotomy, with thorough washing of the contaminated parts, greatly diminished the danger in penetrating wounds of the abdomen, attended with fæcal, urinary or biliary extravasation or copious hæmorrhage, and alluded to Lawson Tait's practice of irrigating the abdominal contents with warm water.

Prof. W. G. WYLIE differed from Dr. Polk as to the prominence of shock as a cause of death in older operations, and attributed the fatal result in at least four-fifths of the cases to sepsis, believing shock to be feared chiefly in cases of large vascular growths. The intra-abdominal tension being very great, when the cavity is opened, the blood vessels of the tumor become distended, thereby depleting the rest of the system, which may be the cause of shock. He would force this blood back into the system and irrigate the parts well with antiseptic solutions.

Dr. C. S. WOOD would treat these cases conservatively, not operating until necessity demands; in large cities where all operative appliances are at hand, operation may be advisable, but in the absence of these it is doubtful.

Prof. A. C. BERNAYS (St. Louis, Mo.) emphatically favored laparotomy in all cases, relating a case of stab-wound operated upon successfully by Dennis by stitching the wounds and replacing the bowel; also a case of shot-wound where, in spite of fæcal discharge from the external opening, persisting for several weeks, the patient, a child, recovered, with practically no treatment but rest.

Dr. G. G. HOPKINS (Brooklyn) believed that the fact of incision in the median line through the minimum amount of tissue explained the better results in cases of abdominal section in gynæcology and advised the same incision in cases of abdominal wounds.—*N. Y. Med. Jour.* 1886. Jan. 2.

VI. Explorative Laparotomy.* By G. R. FOWLER, M.D. (Brooklyn, N. Y.). Opening with a discussion of the different methods of operating, from the strictest antiseptic precautions down to none at all, and, though strongly in favor of the use of antiseptics himself, recognizing the fact that those who ignore antiseptic agents obtain

nearly if not quite as good results as the most enthusiastic devotee of antiseptics, he holds that "success in the surgery of the abdomen, other things being equal, seems to consist in and depend upon carrying to definite length carefully matured plans and purposes." Manual dexterity may compensate for inattention to germicidal precautions. Four classes of cases may demand explorative laparotomy: 1. Those in which a diagnosis is impossible otherwise, but in which further interference is shown by the operation to be impracticable or unnecessary. 2. Those in which only a provisional diagnosis can be made, but, some action being necessary, there is but little additional risk in laparotomy to settle the diagnosis, while with but little additional risk, a radical cure can be obtained, as in cases of chronic ovaritis or salpingitis, with or without hydro or pyo-salpinx, diseased conditions of the vermiform appendix, etc. 3. Those in which a diagnosis has been made but a doubt exists as to the propriety of a radical operation, and those in which the choice of the best operation must be made after the abdominal incision, as in most cases of abdominal and pelvic growths, chronic intestinal obstruction, uterine fibromata, etc. 4. Those in which imminent peril to the patient's life demands the prompt location of the threatening lesion and such prompt action for its relief as may be indicated by the knowledge gained by opening the peritoneal cavity, as in shot or stab-wounds, internal hæmorrhage from ruptured vessels, perforation of the intestines, etc. Robbed of most of its terrors, as it is by modern methods, the operation is believed to be indicated more frequently and earlier than has hitherto been the practice.

In the discussion of Dr. Fowler's address before the Kings County Medical Society, Prof. A. J. C. SKENE advocated a more conservative course. The operation should be performed only when there was good reason to expect more than to simply make a diagnosis, and he deprecated the performance of operations upon the abdominal cavity by practitioners not possessed of the diagnostic skill and manual dexterity acquired by extensive experience. Prof. L. S. PILCHER referred to the great uncertainty of diagnosis felt by even the most experienced operators, and while favoring germicidal precautions in general, cited Lawson Tait's results with simple water irrigation as showing that nearly all of the necessary conditions for operation would be found in the

average home. And while conditions might be found so extensive and perplexing as to require for their treatment great experience and skill, yet an exploratory procedure might reveal a condition which demanded certain action in order to prevent certain death. Men of special skill not being available, he thought that the greater number of physicians would operate, since the certainty of death from inaction would justify them in making this attempt to save the patient. While the decision of the question should be left with the physician himself, there was certainly a field for explorative laparotomy into which the general practitioner might enter.—*N. Y. Med. Jour.* 1886. Jan. 2.

EXTREMITIES.

I. **Covering the Hand with Skin Transplanted from the Chest.** By ALFRED NORTH, M.D. (Waterbury, Ct.), A brass-roller, æt. 26, had nearly all the skin of his left hand stripped off by machinery, several small patches only being left. The little and ring fingers were lost and a portion of the middle and index fingers. During the month following the patches extended rapidly, but the greater portion of the hand still remained uncovered. Small grafts were introduced, and it was ascertained that the best results were obtained (1) by passing a thread through the graft and stitching it to the granulations, (2) by passing a thread through the granulations on either side of the graft and tying the ends over it, or (3) by making a small flap of granulation tissue with the scissors, raising it up and placing the graft under it. Considering this method too slow, about three weeks later a band of skin was dissected up from the chest, ten inches long and two and a half wide, both ends remaining attached; the free edges of the skin on either side of the flap were dissected up for an inch or more and approximated as nearly as possible. The hand was thrust beneath the band, the edges of which were secured to the freed edges of the skin remaining at the base of the fingers and the wrist on the back of the hand, the whole dressed antiseptically and immobilized; the graft adhered promptly and well. Nine days later the upper end of the band was extended about three inches, freed from the chest and drawn over on to the palm of the hand. About one-half of the second flap having died, five days later, the lower edge of the flap was extended four

inches, freed from the chest and brought over on to the palm of the hand; about two-thirds of this flap died, and the middle of the palm was left exposed. An attempt to fill this with a graft from another person was unsuccessful. Cicatricial contraction was combatted by multiple incisions across the hand and fingers. Sponges laid into the incisions and over the granulations proved of advantage in stimulating the growth of the latter and the rapid filling up of the former. The great advantage of the transplantation of large flaps over ordinary skin grafting lay in the short time in which a cure was obtained, the greater portion of the denuded surface being covered in two weeks where it would have ordinarily taken months.—*N. Y. Med. Rec.* 1886. Jan. 9.

GENITO-URINARY ORGANS.

I. Two Cases of Renal Surgery. By F. LANGE (New York).

(1) Lumbar nephrotomy was performed for simple pyonephrosis, but in the pelvis of the kidney was found a considerable number of irregular shaped calculi, which were apparently scattered in all directions through the recesses of the calices: thin partitions had to be broken through to find nests of stones, and although finally no more could be found, the operator was morally convinced that they were not all removed. The patient did well and was discharged practically cured after six weeks. A few weeks later the patient was attacked with acute obstruction of the ureter on the other side. The left side was first explored and a considerable quantity of calculi removed, and then the right kidney was exposed and found to be affected with an abscess which was about to perforate. The pelvis was opened and in the ureter was found a whitish gray plug, consisting of an old fibrinous clot, in which watery substance and numerous gravel like concretions were imbedded. In this case there were no symptoms of stone, although six drachms, varying in size from a pea to a hazel-nut, were found. (2) The diagnosis of pyonephrosis complicated with renal calculus had been made by a number of experienced surgeons, but upon lumbar section no stone was found; the kidney having become cystic and composed of a large number of cysts containing flocculent pus or watery material and its functional value having been destroyed, nephrectomy was performed. *Med. News.* 1886. Jan. 16.

II. Hydrocele of the Hernial Sac. By T. E. MCARDLE, M.D., and L. KOLIPINSKI, M.D. (Washington, D. C.). Struck by the assertion of a well-known text-book that the affection was excessively rare, not more than six cases being on record, the writers have made a study of the subject and quote twenty-four authentic cases. The name is a misnomer, dropsy of the hernial sac being better, and classing it distinctly among watery effusions of serous cavities. It is an acute or chronic condition, due to an inflammatory process, and occurring in a hernial sac, the neck of which is occluded. It may occur (1) at the same time as the rupture, (2) after the formation of the hernia, or (3) in an old hernial sac in which there is no hernia. The majority of cases occur in males and in inguino-scrotal hernia, but it may occur in either sex or in any variety. Schreger's four classes are: (1) the prolapsed parts occupy the upper, the hydrocele the lower part of the sac; occurring chiefly in congenital inguinal hernia; (2) the prolapsed parts fully occupy the sac, the fluid filling the interspaces and being external to the hernia, but not at the fundus of the cavity; (3) the fluid fully fills the sac with a small knuckle of gut or omentum protruding into it; (4) a small hernia succeeds a congenital hydrocele, the hernia not protruding, but contained within the inguinal canal. Produced by an inflammatory serous exudation from the peritoneal lining of the sac and the peritoneal covering of the prolapsed parts, it is necessary, in order to produce a hydrocele of the hernial sac, that there should be an occlusion of the hernial sac, produced by adhesive inflammation, which seals the cavity and may spread to contiguous tissue. The amount of fluid varies from a few ounces to three or four quarts. It almost invariably originates in traumatism. In chronic cases the presence of a large fluctuating, more or less translucent tumor, occupying the site of a hernial sac and by the touch and shape indicating the nature of its contents, renders diagnosis easy; in the acute, the patient having been subject to traumatism, the hernia, heretofore reducible, has increased rapidly and can not be made to diminish in volume by manipulation; there are local pain, tenderness and heat, locomotion is avoided, the patient lies recumbent, while his general condition is not affected; there are no evidences of sudden strangulation and the natural course of the process would be disappearance

or the chronic state; on palpation we have fluctuation and on inspection translucency. Except as it may cause errors of diagnosis, the disease is not a grave one. It must be differentiated from simple hydrocele, and encysted hydrocele of the cord high up, and, from the hernial peritonitis or false strangulation of Malgaigne, and from true strangulation. The methods of treatment vary from tapping and injecting iodine and from opening up the sac to local antiphlogistic applications.—*Med. News.* 1886. Jan. 9.

J. E. PILCHER (U. S. Army).

III. An Urethro-Plastic After Fracture of the Penis and Gangrene. By Dr. ROSENBERGER (Würzburg). A man, æt. 26, injured his penis by stubbing it while erected against the symphysis of his wife. It immediately began to swell, without pain. He did not consult a doctor for four or five days, when a catheter had to be used. Rapid increase of the swelling, extending to the thighs and abdomen. From the tenth day catheterization was impossible, and an incision had to be made in the scrotum towards the perineum. Gangrene of scrotum reaching to right thigh. Profuse suppuration, involving cellular tissue in thighs and abdomen, to some extent. The scrotum, except a narrow border on the left, sloughed off. The urethra in a length of 3 ctm., had only preserved its upper arch, and for this a plastic operation was determined on. A narrow flap was taken from the right thigh, reversed and sewed to the prepared up edges of the urethral remnant. A little of its upper portion mortified, but the remainder united. Later a second flap was made from the left thigh and the border remnant of scrotal skin, and then a third flap was brought down from the abdominal wall. A small portion of the urethra had not united, perhaps because of erections. A fourth operation closed this flap, and, to prevent erectile stretching, he ran a suture through the preputium and tied it to a firmly adherent flap. At one point there was a small recurrent fistula from growth of hair.—*Arch. f. klin. Chirg.* 1885. Bd. 32, Hft. IV.

W. BROWNING (Brooklyn).

IV. Descending Testis in an Adult. Mr. E. H. FENWICK. At the Medical Society of London, held December 7, Mr. Fenwick

showed a case of descending testicle in a man *æt.* 23. At the age of 49 a strangulated hernia developed and was reduced, when, to the man's surprise, it was found that two testicles were present in the scrotum. Prior to the strangulation there was but one small descended testicle. The only case that so nearly attained this age was one recorded by Professor Humphry in a man *æt.* 40. Since the descent of the testicle the man had become the father of a child, though previously twice married, he had had no issue. Mr. Alban Doran suggested that undescended testicle was probably but an association of general want of sexual development. Mr. J. H. Morgan illustrated and supported this suggestion by the narration of a case of absence of anus, in which the left half of the scrotum was not developed, but a testicle of minute dimensions was found during operation in the left side of the perineum.—*Lancet.* 1885. Dec, 12.

V. A Case of Vaginal Lithotomy. By CHAS. WILLIAMS, F.R.C.S. Ed. S. C., *æt.* 62, admitted into Norwich Hospital, evidently considerably emaciated from suffering. Maternal grandfather suffered from stone in the bladder. During past few months had voided thirteen small grey calculi. Urine *sp. gr.* 1.015, contained mucus and pus in large quantity. Bladder contracted on large calculus, forming large, smooth tumor projecting into vagina. An incision was made into vesico-vaginal fold, and with some difficulty calculus was extracted. Stone weighed 7 ounces and measured $8\frac{1}{4}$ inches in circumference. Patient did well at first, but gradually sank and died. Post-mortem. Right kidney enlarged to three times normal size; pelvis converted into an abscess; ureter of this kidney firmly blocked about two inches from origin by a calculus. Left kidney considerably hypertrophied. The records of the hospital show that from 1771 to 1884, 1,234 cases of stone were treated, only fifty-two of this number being females, a proportion of one female to twenty-four males. In twenty-one cases the calculi consisted of uric acid and urates; in twenty-one of mixed phosphates; in seven phosphates and urates the rest mixed.—*Lancet.* 1885. Nov. 7.

H. H. TAYLOR (London).

WOUNDS, INJURIES, ACCIDENTS.

I. The Art of Primary Union, or Union by Adhesion in Large Incised Wounds. By F. H. HAMILTON, M.D. (New York).

The purpose of this paper is to combat the theory of the value of antiseptics in wound treatment, and the name of its distinguished author entitles it to careful attention. The conditions requisite to secure primary union are considered to be (1) fair health, especially the absence of any systemic infection or dyscrasy; (2) the removal from the wound of foreign bodies, among which are included blood and serum; (3) the effusion of a moderate amount of coagulable lymph, and (4) no unnecessary violence to the parts in operating. Attention is called to the division of the history of wound treatment into two periods, (a) the earlier, in which they were left open to unite by granulation, and (b) the later, when union by adhesion was sought for, beginning in the latter part of the eighteenth century, and to the fact that in the latter period little confidence was felt by many surgeons in obtaining primary adhesion, because of the great frequency of failure. To secure this result the utmost care and attention to details is required of the operator, the lack of which was the most frequent cause of failure. This was seen to a marked extent in military practice, where leisurely care was impossible. It was also observed that anæsthetics had a considerable unfavorable influence, in explanation of which the writer records the observation that, under anæsthesia "the muscles do not quiver and retract under the knife, that they hang apparently lifeless from the wound, as in the cadaver, and that they do not resume their normal contractility until some hours after the operation is completed, the arterial blood is imperfectly oxidized, and the surface of the wound has a dark grumous look, wholly unlike the appearance presented under other circumstances; the effusion of lymph, producing the glazed appearance essential to primary union, may then be reasonably expected to be delayed even until beyond the period of possible primary union." He discusses the claims of Lister, to a considerable extent, and attributes his success to careful methods and procedures, rather than to antiseptic precautions, but acknowledges our indebtedness to him for having restored confidence in union by adhesion, and refers to

Tait's results in the belief that they ought "to dispose forever of the much discussed question of Listerism in abdominal surgery." He represses his skepticism as to the *rôle* played by germs in preventing the healing of wounds, referring in sarcastic vein to the criticisms of antiseptists upon the treatment of the case of President Garfield, in which he was one of the consulting surgeons. He disapproves of the substitution of bone for rubber drainage tubes because of their shortness and inflexibility, and seems to prefer silk sutures to those of metal, horse hair or catgut, considering the only advantage of the latter to be its absorbability, while, on the contrary, it is neither as flexible nor as fine as the finest silk, and, according to his observation, has as great a tendency to form small abscesses. After a tribute to the value of hot water as a means of imparting a healthy stimulus to paralyzed tissues, of arresting capillary hæmorrhage, of removing the blood from the surface of the wound, exposing the ends of the vessels to the ligature, and of coagulating the albumin, while, unlike carbolic acid, corrosive sublimate and the like, it is absolutely innocuous, he closes by expressing his belief that the tide of professional opinion is setting strongly toward a rejection of the doctrines of Lister.—*N. Y. Med. Rec.* 1886. Jan. 2.

II. Glycerine as a Surgical Dressing. By S. C. GORDON, M.D. (Portland, Me.). On the hypothesis that excess of blood, beyond what the nutritive process can utilize, interferes with normal repair, and that any portion of the blood, particularly the serum, in a wound or beneath the united surfaces, will have the same effect, the writer has conceived of *surface drainage*, in addition to ordinary deep drainage by tubes, so as to prevent suppuration by carrying off all serous effusion. Recalling the well-known property of glycerine of draining and depleting tissues, as seen in gynæcology, he applied it to surface drainage, with, he states, the happiest results. After securing cleanliness in the operation wound, he first squeezes out pads of absorbent cotton in hot water, then in glycerine, and applies them directly to the wound, bandaging them firmly down. He reports cases of ligature of varicose veins, amputations of the hand and breast and Tait's operation for removal of the uterine appendages, in all of which the results

were unexceptionable, and seemed to fully demonstrate the value of the dressing.—*Boston Med. and Surg. Jour.* 1885. Dec. 31.

J. E. PILCHER, (U. S. Army).

ABSCESSSES, TUMORS.

I. On the Space of Retzius and So-Called Prævesical Abscesses. By J. F. LEUSSER (Würzburg). The occurrence of such an abscess in Maas' clinic gave occasion to this study of the subject. The cavum Retzii is the prævesical or præperitoneal space. The anatomy of the parts is given first, based on the works of previous authors and the examination of five male and of five female subjects. He finds that the cavum Retzii is divided by the transverse fascia of Cooper into two spaces; (1) a cavum submusculare (so-called by Pautzat, better, perhaps, cavum suprapubicum), extending upwards from the symphysis, and (2) a cavum prævesicale (or, from its position, better cavum retropubicum).

From this it follows that abscesses may be either submuscular or prævesical.

As to their etiology he divides them into idiopathic and symptomatic (originating by continuity). The idiopathic form may arise from trauma, local exudation of blood in exhausting diseases, perhaps from colic (strong contraction of the recti muscles depriving local vessels of accustomed support).

Local abscesses after operations (laparotomy, etc.,) are of course not considered. Some really idiopathic cases still remain. The sympathetic form occurs mostly in the prævesical space. It arises from diseases of adjacent parts, bladder, uterus, rectum, prostate (though here the tendency is more towards the sides of the rectum), pubic bone, and troubles following parturition or abortion. Perhaps urethral disease may also be a secondary cause.

The said dividing fascia, though thinner in its lower portion, is in most cases, though not always, sufficient to retain the abscess.

The submuscular form is usually idiopathic. It also less frequently causes urinary and other pelvic symptoms, and even fever. The shape of the tumor is here more egg-shaped; with its base upwards, or irregular in outline, while the prævesical form is more spherical, arising

from the pelvis like the distended bladder. In the latter form fluctuation is more readily determinable through the rectum or vagina.

Occasionally these abscesses are resorbed. The prævesical, if left, may rupture in any direction, the submuscular through either the peritoneum or abdominal wall.

In the first stages diagnosis is difficult. The pain, in contradistinction to enteralgia, is constant, and not relieved by pressure. The prognosis depends largely on early recognition and operation. Perforation of the peritoneum is of course one of the chief dangers. Contrapuncture—after external incision—through the vagina has been practiced in the deep form, but may perhaps not be necessary in view of the recent results of suprapubic cystotomy.

Maas' patient was a tailor, æt. 50, in whom a submuscular abscess had developed without stated cause. Of this form he sums up seventeen cases, of the prævesical twenty-nine—eleven idiopathic and eighteen symptomatic, or secondary by continuity—making a total of forty-six.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. IV.

W. BROWNING (Brooklyn).

II. Melanotic Sarcoma of the Rectum. By CHARLES B. BALL (Dublin). The author points out that primary melanotic sarcoma is a disease of extreme rarity in the rectum, and, according to Virchow, this is the only portion of the intestinal tract in which it has been observed. In the author's case, the patient, a woman æt. 60 had suffered from rectal trouble eleven months before admission into the hospital. The pain during defæcation was great and was referred to a point immediately above the symphysis pubis. She was also troubled with pruritus. On examination the anus was normal and the sphincter not unduly relaxed. Two tolerably hard tumors could be felt, evidently involving the mucous membrane, about one inch from the anal verge. No glandular enlargement could be felt in the hollow of the sacrum, nor was there apparently any disease of the liver or of other abdominal organs. The disease was removed by the usual method. No attempt was made to suture completely the divided portions. The patient made a good recovery. Some time afterwards she was absolutely free from pain and discomfort of any kind, and was able to follow her occu-

pation as a cook. She had complete control over her motions and there was no evidence of recurrence. As far as could be ascertained, the disease originated in the submucous tissue.—*Brit. Med. Jour.* 1885. Oct. 10.

III. Tumor of Spermatic Cord Simulating Hernia, Causing Sloughing of the Scrotum; Operation; Cure. By Mr. SPANTON (North Staffordshire Infirmary). A lad, æt. 15, had observed some months before admission a swelling in the right groin, sometimes reaching into the scrotum, at others passing up the inguinal canal out of sight. The tumor had all the characters of an omental hernia. One day sickness suddenly supervened, with great pain in the neighborhood of the tumor and constipation, and in addition to this it was found impossible to reduce the swelling. The scrotum became œdematous, the induration around the cord increased and the symptoms strongly resembled an inflamed and strangulated omental hernia. On admission the right side of the scrotum was inflamed and œdematous, the testicle could not be felt. An incision was made over the right spermatic cord which revealed a sloughy condition of the subcutaneous tissue. After dissecting this away a hard mass occupying the position of the cord came into view, extending up to the external abdominal ring about two inches in length and about the size and shape of a large pigeon's egg. A ligature was placed as high up on the cord as possible, and the whole mass with the right testis dissected away. The wound healed rapidly. The growth when cut into was almost of cartilaginous hardness and consisted of dense connective tissue. When it became inflamed the vessels in the cord were probably compressed and thus sloughing of the parts concerned took place. From notes by S. Cann. *Lancet.* 1886. Jan. 2.

H. PERCY DUNN (London).

BONES, JOINTS, ORTHOPÆDIC.

I. On the Etiology of Indirect Fractures of the Shaft of the Radius. By Dr. R. FALKSON (Königsberg). Statistics are first given of 155 cases of radius fracture observed in three years. Amongst these were three of fracture in its middle third, all originating in a similar manner.

1. Boy æt. 14 was trying to hold back a heavy weight by pressing with the flat of the hand against a support. The weight seems to have caught his forearm lengthwise. He felt a sharp pain and could no longer use his arm. The fracture was between middle and upper thirds. Moderate axial dislocation to the flexor side. Crepitation.

2. Man æt. 18. Pushing along between two ships by means of his hands against their sides. Blow on the elbow from a cable knot. He felt a snap and intense pain. Fracture in middle third.

3. Powerful man, æt. 28. While trying to push off a ship, it lurched and drove his elbow against the dock, causing a somewhat oblique fracture at just about the middle.

Only in Bardeleben does he find it stated that this fracture usually results from direct force. Other writers state the contrary.

In F.'s cases the hand was in about rectangular dorsal flexion, in which position the ulna and radius are crossed and most of the force is transmitted to the latter. The slightly curved form of the radius also weakens its resistance.—*Centbl. f. Chirg.* 1885. Dec. 25. No. 52.

II. Spontaneous Dislocation of the Femur in the Course of Acute Infectious Diseases. By Prof. SONNENBURG (Berlin). This rare affection may occur in such general infectious diseases as variola, acute articular rheumatism, and especially typhoid fever. For dislocation of other joints he refers to Gueterbock (1873, shoulder) and Verneuil (1883, knee).

There are various hypotheses as to the origin of these cases. Some former ones may in reality have been osteomyelitis. The most probable view is that in cases without suppuration there is a dropsy of the joint with relaxation of the capsule. Others assume that suppuration is always present; while Verneuil and also Reclus (1883) teach that it results from the action of certain groups of muscles (flexors and adductors whose antagonists are paralyzed).

Two new cases are described.

1. Girl æt. 18. Fell from a chair a year previously and had some pain in the knee. Shortly afterwards she had typhoid fever. On getting over this she noticed a change in the left leg. It was so much

flexed, shortened and turned outwards that she limped badly. Extension had been tried, but to no purpose.

There had been a dislocation of the hip-joint forwards. It was also found (under chloroform) to be ankylosed.

S. first chiseled through the neck of the femur, whereby the flexion was practically remedied—not so the adduction and shortening. Later he chiseled through the femur below the trochanter. The leg could now be brought into about its normal extended position.

2. Boy æt. 12. Admitted in February, 1885. Small-pox in October, 1884, since which time he has kept his bed. When nearly well of the pox he suffered from pain in arms and legs, especially in left shoulder and hip. Immobility of left arm then appeared. S. found an almost complete ankylosis of the left shoulder and a dislocation of the femur backwards and upwards. The head of the femur pressed firmly on the pelvis, but was not entirely ankylosed. This displacement appears to have developed gradually. It was reduced to the old position as well as possible. After extension for three or four weeks the boy was allowed to walk with a Taylor apparatus.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. IV.

III. Exsection of the Knee-Joint in Children. By Dr. A. HOFFA (Würzburg). In view of the recently recommended substitutes, arthrotomy and arthrectomy, H. has made a study of the later results of resection, especially as regards its preventing general tubercular infection. This operation is now so successfully done that a number of operators have reported series of twenty to thirty without a fatal case. Moreover, improved wound treatment has materially shortened the duration of cure, from four to thirteen months down to even one to two, the formation of an ankylosis included. His collection represents 130 cases—nine of which he has added where the children have been examined at least a year post operationem and in most cases much longer. A brief sketch of each is given. These show that in the great majority of cases the local tuberculosis can thus be cured. In five cases fistulæ still persisted. In some cases, however, abscesses and fistulæ develop shortly after the operation, thus making the child's condition worse. To estimate the frequency of this he adds up the number of

after-amputations in several series of published cases, together with twenty-five from Maas' clinic—eleven amputations in 195 cases, or 6%. Now even the most careful removal of all morbid tissue does not surely protect from relapse even after exsection. How much less certain then must this be after the partial operation of arthrotomy, resp. arthrectomy? Of the children who, despite the operation, die from some form of tuberculosis, he reckons up thirteen amongst 186 or 7%. Most of these doubtless were suffering from tuberculosis of some internal organ at the time of the operation.

The functional success of an exsection of course depends on the result desired. Ankylosis is usually hoped for; on the other hand, retardation in the growth of the limb and contracture are not. As to shortening, it is necessary to distinguish between cases where the epiphysal line is preserved and where it is not. His cases of the removal of both epiphysal lines show that at the end of ten years the shortening may amount to $25\frac{1}{2}$ ctm., while in another case it amounted in two years to 10 ctm. The shortening in most cases corresponded to the time elapsed. It was, however, so far remedied by tipping of the pelvis and by high soles that the extremity was still useful.

Where only one epiphysal line is destroyed there is still shortening, though less. Loss of the femoral line showed 17 ctm. shortening in 6 years and 7 ctm. in $1\frac{1}{2}$ years. Two cases of like duration affecting the tibial line showed $15\frac{1}{2}$ resp. 6 ctm.

The cases where these lines were preserved he considers most important. These do not show a gradually increasing shortening as clearly as the previous series. It amounted in one case at the end of six years to $13\frac{1}{2}$ ctm.; in other even older cases it was much less, and up to the end of two years it never exceeded 5 ctm.

In many cases of tubercular joint disease, however, a shortening is demonstrable on their entering the hospital; this may be great in cases which heal in the course of years without resection. In one such it amounted at the end of 12 years to 18 ctm., with ankylosis at an angle; in nine of these cases collected by Caumont, ranging in duration from one to eight years, the shortening varied from 1 to $13\frac{1}{2}$ ctm., with angular contracture in most cases. Here atrophy and trophic disturbances are very marked. In equally bad cases exsection gives better results.

To save the epiphysal line König's rule is valuable: "Saw off inside the extent of the cartilage." After this any remaining morbid deposits must be scraped and chiseled out. A permanent dressing hastens cure, renders early use of the leg possible and thus limits atrophy.

Angular contracture is a much worse sequence than shortening. It was more frequent formerly than now. In his list he finds twenty-four cases of slight and thirty of large flexion noted. The former result is, however, frequently intentional. The cause of the greater permanent flexion in some cases is disputed. It may follow in adults, as in a case which H. gives, but this is rare. He finds that it always begins early. It is known that the extensors atrophy earlier than the flexors, and that the latter are normally the more powerful. If the bony surfaces are so coaptated as to make a slight bend then contracture results the more easily. Dispensing with supports too early also predisposes. These factors, he thinks, suffice to explain the cases of flexure. Bony ankylosis is the surest preventive, though as to the frequency of such ankylosis there is also a dispute. He gives a case of Maas', girl æt. 16, where bony union of the anterior portion of the surfaces was found at the autopsy one and a half years later. He recommends Hutchinson's tenotomy of the flexors in severe cases where the cure will probably be slow. He finally details Maas' latest approved method: 1. Strict antiseptis. 2. Straight, not oblique, sawed surfaces. Removal of any remaining deposits in the bone. Extirpation of all soft articular structures. Washing out the joint with tincture of iodine. Tenotomy of the flexors. Wiring the bones. Series of sutures to the soft parts. Button-hole drainage. 3. Permanent antiseptic dressing. 4. After removal of this dressing a fenestrated plaster bandage and application of iodine tincture to the cicatrix. 5. Wearing a support (waterglass bandage) for at least a year.—*Arch. f. klin. Chirg.* 1885. Bd. 32. Hft. IV.

W. BROWNING (Brooklyn).

IV. Case of Simultaneous Dislocation of Both Ends of the Clavicle. By G. W. HULKE (London). The patient, a woman, æt. 39, was knocked down by a cab, the knee of the horse striking her in front of the shoulder and above the breast. On admission the

left clavicle was found to be completely dislocated at both ends. The left shoulder had fallen forwards and inwards, and the head was inclined towards the left side.

The sternal end of the clavicle rested on the upper part of the anterior surface of the manubrium sterni, forming a marked projection beneath the skin. The acromial extremity was displaced backwards and inwards, resting on the scapular spine opposite its junction with the acromial process. Thus the long axis of the bone was found to be placed in an antero-posterior rather than in the normal transverse direction. Both the manubrial and the acromial articular facets could be plainly felt as concavities beneath the skin. By drawing the shoulders backwards the bone slipped easily into position, but on relaxation the luxation was immediately reproduced by the slightest action of the trapezius or sterno-mastoid muscles. After reduction the bone was kept in position by means of a gutta-percha splint fitted to the shoulder, reaching slightly past the mid-point of the sternum in front. On the twentieth day the patient was allowed to get up, and the splint was left off; the arm was carried in a sling. It was noted that the sternal end was a little above its true position, and the point of the shoulder a little lower.

In some excellent remarks which accompany the notes of this case it is stated that the case derives its interest from its great rarity, two other cases only being previously recorded—the first a very incomplete published account, by Richer and Geidy, and the second an excellent observation by Morel-Lavallée. (From notes by Leopold Hudson).—*Lancet*. 1885. Aug. 8.

H. PERCY DUNN (London).

V. Intra-Articular Inflammatory Adhesions After Wiring a Simple Fracture of the Patella. By Dr. L. A. STIMSON (New York). The reporter had had the opportunity of observing the condition of a knee-joint two months and a half after the patella had been wired for a simple fracture. The patient, a man æt. 21, came to Bellevue Hospital last June with simple fracture of the patella, and was treated by one of Dr. Stimson's colleagues by making a transverse incision and wiring the bone with silver wire, two sutures being

inserted. The case did perfectly well, and the patient recovered without any elevation of temperature or manifestation of trouble in the joint. When Dr. Stimson first saw him, two months and a half after the operation, the fragments were closely united, without independent mobility, and the patient was walking about the wards with a condition of the knee which allowed the joint to move through the arc of a circle of about 20° . About one week afterward, while descending the stairs without falling, stepping down with the sound leg forward, he fractured the patella which had been broken. Previous to the accident Dr. Stimson had noticed what seemed to be one of the wire sutures which could be felt under the skin, and the patient had felt a slight pricking pain at that point throughout the progress of the case. In the second fracture the old cicatrix was torn open. Dr. Stimson enlarged the wound, and found that the second fracture had taken place exactly in the line of the first; one wire was entirely, the other almost entirely, loose in the wound, and the site of each was marked by small cavities in the fragments. The surfaces of fracture were not so rough as usual, and Dr. Stimson thought that union had taken place, in part at least, by a very thin intermediate layer of fibrous tissue. On the inner corner of the upper fragment, where, in the first fracture, there had been a small loss of tissue, there was a distinct fibrous band, as large as his little finger. On wiping out the blood he saw a membrane of new formation underlying the patella, and entirely separating the fracture from the cavity of the joint, except at one point, where it was torn for half an inch; through this opening he was able to see false membranes within the joint connecting the condyles of the femur with the tibial head. He cleansed the wound, brought the fragments together with catgut and closed the wound, and the patient was now well. The fragments had again united, and there was some mobility in the joint. It was now two months since the second fracture. The reason Dr. Stimson reported the case was because he had seen not long ago the statement that there was no case known where any membranes of new formation had formed in the joint after wiring of the patella for simple fracture. But this joint was full of them, and they had formed without any inflammatory reaction or any symptoms indicating their formation. Again, it has been stated that a patient

with a fracture of the patella treated by wiring could be dismissed cured at the end of four weeks. Dr. Stimson did not know of any other similar fracture which was perfectly sound at the end of so short a period of time, but here was a case in which two months and a half had elapsed since the fracture, which had done well, and which, if reported two or three months ago, at the stage at which most cases had been reported, would probably have been cited as another example of the safety and value of the method of treating by wiring, and yet the union proved not to be strong enough to bear the weight of the body in descending stairs, and the joint did not allow of more than 20° or 30° of flexion.—*Proceedings N. Y. Surg. Soc.* 1885. Oct. 27.

VI. Compound Fractures of the Tibia and Humerus Treated by Wiring the Fragments. By J. R. CONWAY, JR., M.D. (New York). Relates a typical case of compound fracture of each of these bones, treated by exposing the bones with the most thorough antiseptic precautions, removing all effused blood, any badly contused or lacerated tissue and other foreign matter, drilling the exposed ends of the bone, wiring them with silver wire, and, after inserting a suitable drainage tube, applying antiseptic dressings and splints. The dressing should be of sufficient bulk to absorb the discharge expected—a certain amount of blood and serum—so that it will not be necessary to change them for a considerable period. The length of time the drainage tube is left in place varies from ten to thirty days, according to the severity of the contusion. In ordinary cases, where there is not excessive contusion and loss of tissues or badly comminuted fracture, the removal of the second or third dressing and splints usually leaves the parts perfectly repaired; in severe cases the dressings have to be changed somewhat more frequently.—*N. Y. Med. Jour.* 1886. Jan. 16.

GYNÆCOLOGICAL.

I. Dermoid Cysts of Both Ovaries. A Diverticulum From the One on the Left Side Included Within the Rectum. Ovariectomy. By J. E. JANVRIN, M.D. (New York). The patient observed while at stool, six years previously, a bundle of hairs

protruding from the anus, which, after repeated attempts, accompanied by severe pain, she pulled out three years after. Enlargement of the abdomen was not until two years previously. Abdominal section in the median line exposed a large cyst which had developed from the right ovary and was the seat of three dermoid cysts, containing sebaceous matter and hair, and which was readily removed. A tumor, the size of an orange, was found still remaining on the left side of the pelvis; this was enucleated forcibly, the pelvic peritoneum being torn in the operation, and a fibrous prolongation was discovered in the direction of the rectum; drawing upon it with sufficient force, the rectum was torn open to the extent of an inch and a half, and through this opening was drawn—attached to the tumor by the fibrous prolongation—a small diverticulum, which had growing upon it a long lock of black hair, smeared with unmistakable fecal matter. The wound in the rectum was closed by a continuous silk suture with great difficulty, because of its situation at the bottom of a deep and dark cavity, illumination being obtained from a mirror. The toilet was made with care, the wound dusted with iodoform and dressed antiseptically. The patient made a good recovery in spite of an obstinate vesical irritability and an extensive mural abscess at the site of the drainage tube, and was entirely cured two months after the operation.—*Am. Jour. Obstetrics*. Jan. 1886.

J. E. PILCHER (U. S. Army.)

II. On Operations for Prolapse of the Uterus and Vagina. By Dr. A. MARTIN (Berlin). He operated on 246 cases, of which forty-two, according to Hegar's method, four according to Winckel, five after Bischof's and twenty after his own method, described in a number of Volkmann's clinical lectures.

He undertakes the abrasio mucosæ, amputation or excision of the collum, anterior and posterior colporrhaphy all in one sitting, which generally occupies something less than an hour. Scarcely 4 per cent of all his cases had a normal uterus.

C. Rokitansky's theory that catarrh, dislocations, etc., of the uterus disappear as soon as that organ has been returned to its normal place in the pelvis, through colporrhaphy, etc., Martin is not inclined to ac-

cept, and recommends, therefore, the abrasio mucosæ and amputation of the collum, the results of which are beneficial and satisfactory, long existing endometritis disappearing and consequent pregnancy pursuing a normal healthy course. About 82 per cent of his cases had an elongation of the collum with hypertrophy, and in over 90 per cent there was retroflexion of the uterus. The number of permanent cures of retroflected uterus appears to have been small, as Martin reports only seventeen. In many of the others a pessary was found later on to be necessary. In three cases of older women, rendered incapable of work by the large extent of the prolapse, for which they had been often operated, M. attained excellent results by extirpating the uterus and adding later on anterior and posterior colporrhaphy. He considers anterior colporrhaphy of great importance, not only for reducing the size of the prolapsing mass, but in allaying the continual dragging on the bladder. Hegar's method for performing posterior colporrhaphy does not seem to have found much favor with Martin, nor do those of Winckel and Bischof. He prefers his own method, which consists in excising the lateral folds on both sides of the posterior columna nigrarum, the latter being thereby retained as a firm support. For sutures he uses silk (carbolyzed), and also catgut, prepared as recommended by Küster, in juniperus oil. This latter has given him much satisfaction. He does not recommend the use of the continuous suture, as it is difficult to adapt the edges of the wound and attain even pressure in employing it.

A weak solution of corrosive sublimate was used for washing and the rules of antiseptic surgery maintained throughout. His patients remain in bed, lying on the back, for three weeks, the lower extremities being bound together to prevent movement, thus disturbing the healing process. The bladder is emptied twice daily by means of the catheter, the external wound being washed off afterwards. The silk sutures are extracted on about the tenth day after operations from the perineal wound, and in the course of three to four weeks as many as easily come away, from the vagina. Those in the uterus are left much longer, often two or three months. M. considers secondary hæmorrhage best avoided by careful and exact application of sutures. One hundred and ninety-five of his cases were complicated by parame-

tritis, more or less diffuse, all of which, however, recovered. Some thirteen cases became pregnant afterwards and were confined, experiencing no trouble from their former complaint. Eleven cases had a return of the trouble, but this was owing to the fact that the individuals themselves were well advanced in years, and were obliged to do much hard work. In two, however, M. could give no reason for a return of the prolapse. As the result of his experience, M. considers a radical treatment in these cases of prolapse by far the best, and is opposed to any palliative treatment, therefore, unless a general constitutional trouble or senile weakness should, contra-indicate an operative interference.—*Deutsch. Med. Woch.* 1886, 14 Jan.

III. On the Malignancy of Ovarian Cystoma, Especially of the Glandular Ovarian Cyst. By Dr. R. SCHLEGTENDAL (Hanover). S. reports following case: Patient æt. 52, poor physical condition, has had an abdominal tumor for four years. No cachexia. A large fluctuating tumor is felt in the abdomen, reaching about the width of hand above umbilicus. Bimanual exploration gives no pain. Posteriorly to uterus a second elastic tumor felt, probably connected to abdominal tumor. The latter is probably a cystic growth, arising from some organ in the smaller pelvis. Ovariectomy. Cyst bluish, semi-translucent, containing gluey and consistent mass of greenish color. On the left broad ligament a few small cysts and a cyst extirpated from right round ligament. A large number of small cysts were found on a narrow strip of the omentum along the colon, and which contained a clear fluid substance. As the patient already showed signs of collapse it was impossible to extirpate all of these latter. Owing to the consistent and sticky character of the cystic contents it was impossible to properly cleanse the abdominal cavity, and the wound was closed and dressings applied. Patient pretty comfortable and doing well until second day, when there was some rise in temperature and pain. Bandages removed on third day. Wound looks well. Compresses soaked in chlorine water applied. Death on fifth day, symptoms of collapse having set in the day previous. Autopsy. Wound healed per primam. Abdomen contains $\frac{1}{3}$ litre of watery opaque fluid, and in the smaller pelvis some gelatinous substance and some coagulated blood. On the

convex surface of liver and capsule of spleen, lower border of stomach and on the small intestine were miliary and larger cysts, also large cysts on the cœcum and descending colon.

In a case which Beinlich reports death occurred three days after the operation, from collapse, the drainage tubes having become clogged with the gluey cystic contents, and in which the results of the autopsy were about the same as those described in the author's case. Virchow called this a myxomatous degeneration of the peritoneum. In a second case of Beinlich, death occurred on the fourth day, with no appearance of sepsis. Beinlich also gives a third case, and in both of these last two cases the results of the autopsy were similar to those of the first. Atlee has reported on two cases, one of which, however, died after the cyst was punctured, before an operation was undertaken, and the other after ovariectomy had been performed. Mayer describes the following case. Patient *æt.* 48. Cyst contained yellowish, sticky and consistent mass. Peritoneum, both parietal and visceral, covered with small protuberances. As in the other cases a complete toilette of the abdomen was impossible. Patient died on the nineteenth day. The results of the autopsy agree with those of the cases described above. Virchow called this also a myxomatous cystoma, the rupture of which led to a general infection and myxomatosis of the peritoneum. In a case of Thornton's there was a sudden effusion into the abdominal cavity and symptoms of rupture of the cyst, without much reaction. Fourteen days later he found a new tumor in Douglas' space and operated. The peritoneum, Douglas' space, omentum, contained papillary excrescences and small cysts, similar to the ovarian cysts. Thornton regarded this new cyst-formation as caused by infection after puncture and cautions against the latter.

Smith operated a cystoma and found signs of old peritonitis and old cyst-ruptures. Recovery without fever. Similar cases have been observed and operated by Colrat, Olshausen (3), Baumgarten (3), Negri, Lindemann, Hannover, Marchand, E. Wagner and Maygrier. These prove beyond doubt the existence of a metastatic form of ovarian cystoma, the appearance of which, however, is not at all frequent, when compared to the large number of ovariectomies where this complication is not found. All these cases agree as to the consistent, sticky charac-

ter of the cystic contents, and as regards the thinness of the cystic membranes, from whence the frequency of rupture and consequent dissemination. Peritonitis would not necessarily follow such an event, owing to the gradual and slow manner with which the consistent cystic contents would empty themselves. The omentum, smaller pelvis, convex surface of the liver, cœcum and sigmoid flexure seem to be the parts mostly affected by this process of metastasis. Olshausen was the first to call attention to the malignancy of those cystomata having a papillary structure, with which Marchand also agrees. Mayer also remarks on the danger likely to arise from the malignant degeneration of these papillæ. Coblenz distinguishes the glandular from the papillary form of cystoma, and advises immediate extirpation of the latter to avoid infection. Fleischlen found not alone in sixty-nine cases of glandular cystoma four, and in fourteen cases of papillary cystoma two, which showed carcinomatous degeneration, but mentions especially the malignancy of the papillary form. The dangerous nature of the latter therefore, appears to be generally accepted.

Contrary to the prevalent theory as to the benignity of the simple myxoid-cystoma (or proliferating glandular cystoma of Waldeyer) a case of non-papillary cystoma reported by Baumgarten shows that this form also may be of a very malignant nature. In this case, as in the author's, the microscopical examination failed to discover any papillary excrescences in the structure of the cyst. The author does not agree with Baumgarten concerning the genesis of the metastatic infection, the latter holding that the secondary neoplasms result from veritable metastasis, and not from a casual inoculation of the abdominal cavity, such as could take place through the epithelium cells of the cyst during an operation. The author is inclined to believe in a resorption of particles of tumor by the peritoneum, where they remain. Otherwise, he asks, why should only the peritoneum and the immediate neighborhood be infected and not, for instance, the liver? In conclusion the author thinks with Baumgarten, that these two cases materially set aside the idea of absolute benignity or incapability of metastasis of the so-called homogenous tumors.—*Berlin. klin. Wochens.* Nos. 2 and 3. 1886. Jan. 11 and 18.

C. J. COLLES (New York).

THE OPERATIVE TREATMENT OF FACIAL NEURALGIA—A COMPARISON OF METHODS AND RESULTS.

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NEURALGIA as it affects the trigeminal or fifth cranial nerve is, perhaps, with the exception of sciatica, the most common form of the disease. The branches most commonly affected are those of the ophthalmic and superior maxillary or first and second divisions of the nerve. Either of these separately, and frequently both at the same time, may be affected. The third division is the part most rarely attacked by the more intractable form of the disease, and still more rarely does it occur that this latter is attacked in conjunction with one of the other nerve trunks.

When the situations of these nerves are taken into consideration, and the fact that they pass through foramina and canals with bony, and hence unyielding, walls, together with their distribution to the teeth, organs especially prone to destructive processes among civilized nations, and the exposure of their peripheral extremities to alternations of heat and cold, it is not a matter of surprise that they are frequently the seat of neuralgia. In addition to these, neuralgia here as elsewhere, may depend upon the condition which Erb has called "the neuropathic predisposition."

It is my purpose to deal only with those obstinate, agonizing and otherwise intractable cases which fall under the surgeon's care for operative treatment, in this paper. It may not be out of place to consider briefly the character and origin of these severe forms of the disease, and with that end in view it will be convenient to speak of them as being of peripheral and

of central origin. Examples of the former may be instanced as due to neuritis, acute and chronic, idiopathic or traumatic; morbid growths upon the bony walls of foramina through which the nerve or its branches pass; syphilitic periostitis in these localities, and neuromata. Cases of undoubted peripheral origin also occur in which none of these conditions can be demonstrated as being present. These form the subject of surgical interference most frequently, although it is not at all uncommon to have operative measures invoked in cases of central origin. The latter class of cases, although they form a very important group, are of minor importance in the present inquiry, depending as they do upon diseases of the central nervous system and associated with such conditions as sclerosis, cerebral softening, tumors, hyperæmia, etc., for which operative measures, although they may serve for a time in holding in check the peripheral pain, cannot in the true sense of the word be said to be curative. Nor can any more than a like effect be claimed for the interposition of surgical art in the class of cases in which injury to a remote nerve, for instance the ulnar, as in a case cited by Anstie, is the cause of persistent pain in the branches of the trifacial. Those neuralgias of a reflex character, or irritations of peripheral organs transferred in the central nervous system to sensory paths, in which latter they give rise to the sensation of pain, although scarcely to be classed among true neuralgias, also deserve mention in this connection, from their intractable and chronic character.

To return to the class of cases in which the sensations of pain, referred to the periphery, are due to diseased conditions of the central nervous system—even here a well-planned operation will frequently give the most brilliant results, although of an evanescent character. This is attested by the published experiences of Schuh¹, Nussbaum², A. Wagner³, Patruban⁴ and S. D. Gross. The beneficial results, however, which in most cases can be expected to be but temporary, are not easily explained. Bell⁵, many years ago, made the observation that

¹ Ueber Gesichtsneuralg. u. Nervenresection, 1858.

² Bayer. *Aertzl. Intelligbl.*, 1863.

³ Ueber nervös Gesichtschm., etc. *Langenbeck's Archiv.*, xi.

⁴ Woch. d. Geseltsch. a. Wien. Aertz., 1869.

⁵ London, 1830.

section of the nerve produced an alterative and tonic effect upon the nervous system. A. Wagner¹, on the other hand suggested that the improvement depends upon the fact that the excitation of the central lesions by the centripetally conducted stimuli are productive of the paroxysms of severe pain; by interrupting these for a time, the diseased central organ is at once placed in the condition of rest, and this, the first essential in the cure, becomes at once accomplished. The practical point involved in this attempt to account for the beneficial results is obvious, and has an important bearing upon the necessity, or otherwise, of an extensive operation. If the first mentioned theory, so well expressed in the words of Erb², "that the strong peripheric stimulus of the operation is the cause—though in what way it acts is not very obvious—of the disappearance of the neuralgia, and that, like strong counter-stimulation of the skin, it acts as an energetic stimulant, and thus leads to at least temporary recovery," is the correct one, it will be at once evident that an extensive operation upon the nerve trunk is not indicated; on the other hand, upon the theory of giving complete rest to the diseased central organ by removing the route or medium of communication along which peripheral stimuli are conveyed, a more radical operation would be indicated.

Having thus, as briefly as possible, considered the class of cases of facial neuralgia coming under the care of the surgeon, it is proposed to consider, from a practical standpoint, what resources we possess for the relief of these sufferers, excluding the use of hypodermic injections, both those which act through the medium of the general circulation, such as morphine, atropine, etc., as well as those which have a purely local action, such as osmic acid, for the reason that these measures of relief have, as a rule been faithfully tried before the case comes to the surgeon. There remain those measures more distinctively surgical upon which surgeons have relied with greater or less confidence in the operative treatment of this affection. These include neurotomy, neurectomy, nerve stretching and the arrest of arterial blood supply.

¹ Op. cit.

² Diseases of Peripheral Cerebro-Spinal Nerves. V. Ziemssen's Cyclopaedia, vol. xi, p. 95.

NEUROTOMY.—Naturally the first operation of anything like a radical character to which surgeons resorted in the treatment of these cases, was that of neurotomy. The attempt to inhibit the propagation of the irritation arising from some pathological change in the nerve by dividing the medium of communication between the seat of change and the brain was hailed as a panacea in the class of cases under study. That it was resorted to, in the first instance in a most unscientific manner, the early literature of the subject clearly shows. Instances are frequently mentioned, in which motor, as well as sensory nerves were divided, and the frequent occurrence of paralysis of the muscles of the face, led surgeons to regard these cutting operations with distrust. Later on we find, after physiologists had definitely pointed out the functions of the nerve distribution of the face, the operation was revived, only to be again rejected, when a more extended experience with it as applied to nerves of a purely sensory function demonstrated its almost utter inutility as a permanently curative measure. It was soon discovered that cases almost invariably relapsed after neurotomy, and the reason for this became at once evident. The divided portions of the nerve became reunited, and as soon thereafter as its essential elements were restored, the pain returned. At the present time the operation, if performed at all should be resorted to only in those cases of central origin as a step preliminary to excision of a portion of the nerve, and may, perhaps be supplanted by that of nerve-stretching, to which attention will be called further on. The operation finds but few, if any supporters at the present day, and is quite ignored in the more recently written treatises upon surgery.

NEURECTOMY.—Nerve excision, or neurectomy, suggested no doubt by the frequent occurrence of reunion of the divided nerves, after simple neurotomy, and the consequent ultimate restoration of its functions and return of the pain, rapidly gained in favor by its incomparably better results. This was achieved mainly through the efforts of A. Wagner, of Germany, and Dr. Carnochan and the late Prof. James R. Wood, of New York. Marechal, surgeon to Louis XIV performed it for the relief of trigeminal neuralgia as early as the fifteenth

century¹. Wagner² has laid the profession under the greatest obligations by the systematic collection and tabulation of cases of neurectomy for the relief of intractable neuralgia of the fifth cranial nerve. Prof. Dennis³, of New York, has collected and tabulated a number of cases of neurectomy of the second division of the trifacial in which the sphenopalatine or Meckel's ganglion was also removed, this constituting the procedure commonly known as Carnochan's operation. The names of Schuh⁴, von Nussbaum, Billroth and Patruban are also prominently identified with the surgery of the trigeminal nerve.

Owing to the difficulty of determining, in most instances, the exact seat of the change in the nerve in cases of peripheral origin, it will be manifestly proper, in this class of cases, at least, to excise a portion of the nerve as close to its point of exit from the brain as possible. This has led to the devising of most extensive dissections, as in the operation of Carnochan, and osteoplastic resection of the superior maxilla as adapted by von Nussbaum⁵ and Gerster⁶ of New York, after Langenbeck's operation for the removal of naso-pharyngeal growths. Some of the most daring undertakings in surgery have been entered upon for the relief of this class of sufferers. That patients are found who are willing, and even anxious, to submit to these extensive mutilations only serves to show how dire must be their extremity, how pressing their need for relief. It is likewise of importance in centrifugal cases, if a neurectomy has been decided upon, that as much of the nerve, in a peripheral direction, as possible, should be removed; in other words, the entire trunk, together with as many of its branches as practicable, should share in the excision. The reason for this is obvious: should the source of irritation be situated at a point bordering upon the area of distribution of a neighboring nerve, or at a peripherally distant point, it is quite possible that a communicating filament or twig passing to the latter may

¹Hildenbrant. *Nervendehnung. Neurektomie und Nervennaht; Ein Beitrag zur Nerven Chirurgie.* Berlin, 1884.

²Wagner. *Archiv. f. Chirurgie*, Band XI.

³N. Y. Med. Journal, June, 1879.

⁴Am. Journal Med. Sciences. Phila. Vol. 35, page 134. 1858.

⁵Aertliches Intelligenz Blatt, August, 15, 1863.

⁶Med. Record, N. Y. 1882, Vol. XVI, p. 300

exist, in which case the irritation would be conveyed along this route to the brain. That these communications frequently exist between nerve trunks and their branches, and that a nerve is capable of transmitting to the brain impressions of sensations having their origin in a neighboring and communicating nerve, there can be no doubt, although it may be conceded that no true anastomosis, in the sense that the nerve tubules with their myeline become continuous, one with another, as in blood vessels, takes place. The researches of Waller demonstrate the fact that each nerve tubule, with its axis cylinder and myeline are continuous from origin to termination. But when a communicating branch is given off, it implants itself upon, or becomes attached to the neighboring nerve in such a manner as to recurve or direct its course, so to speak, towards the central origin. In the plexuses these branches are known to be given off, and in the ultimate distribution of nerves more or less communication exists where different areas of distribution border upon each other. These facts, namely, the existence of communicating branches, both in the plexuses and peripheral distribution, and the direction of their course after becoming attached, from the periphery toward the centre, coupled with the now general belief that the sensory nerves convey impressions only from the periphery to the centre, while motor nerves convey the current of nerve force from centre to periphery, will serve to explain why these communicating or anastomosing branches or twigs make their influence felt, in the cases of sensory nerves, and yet are of no avail in motor paralysis. For these reasons it is advisable to follow, whenever possible, the nerve, from the point where its trunk breaks up into the branches distributed to the surface, as far as possible in the direction of this distribution. This may be done by turning up a flap, as in Carnochan's operation, and by following up the nerve trunk in a central direction to the point where it emerges from the base of the skull. In those cases in which the particular branch involved can be definitely determined, the suggestion of Agnew¹ may be followed of planning the operation in accordance with the relative degree of local pain. Diffi-

¹Principles and Practice of Surgery, Vol. 1, 316.

culty, however, will almost always be encountered in settling this point, and most surgeons will prefer to excise the entire nerve trunk as well as its branches, whenever practicable.

In cases of undoubted central origin it becomes a serious question regarding the operation to be performed; the wisest course, it would seem, to pursue, would be to employ a limited neurectomy, conjoined with nerve-stretching at the outset, in the hope that the influence of this counter-stimulant will have a favorable effect upon the disease. This can be repeated as often as the pain recurs, providing the intervals of freedom are reasonably long, and warrant the belief that these correspond with the length of time usually occupied by the processes of degeneration and regeneration of the divided nerve. This could not be expected to occur under six months, at the shortest, according to Augustus Waller¹. Should the pain return within a shorter space of time than that above mentioned, it would probably be due, not to an immediate union of the divided ends, and restoration of function without degeneration occurring, for this is denied by most authorities; but probably to the existence of a communicating branch from a neighboring nerve between the point of section and the central lesion. In such an event a subsequent complete neurectomy would be indicated.

In obstinate cases of peripheral origin there can be no question as to the propriety of operating by neurectomy. The accessibility of a portion of the nerve to the surgeon's knife, lying between the seat of pathological change and the brain, constitutes a positive indication for operative interference.

It sometimes occurs that, after a time, the sensation returns in the area of distribution of the excised nerve trunk, without a return of the neuralgia. This disappearance of anæsthesia, without relapse, in cases of peripheral origin, is believed to be due to the fact that the diseased condition of the nerve disappears during the degenerative and regenerative processes which nerves undergo after the infliction of traumatism sufficient to produce temporary abolition of their function. The

¹A succinct résumé of the results of the experiments of Waller, adapted from Ranvier, is given in an able paper by Prof. Markoe, entitled "Secondary Nerve Suture," *ANNALS OF SURGERY*, vol. 2, p. 189.

longer this return of sensation is delayed, the better the prognosis as regards duration of relief or permanent cure.

It has been suggested by Erb that a recurrence of the pathological condition, for which the nerve was excised, may occur in the central segment, and thus lead to a relapse. It might also be pointed out that the presence of a neuroma upon the stump of the resected nerve, as occurs sometimes after amputation, would produce, to a greater or lesser degree, the former symptoms.

In cases of supposed central origin after resection of the nerve to the point where it makes its exit from the skull, the pain will sometimes be found to persist with considerable intensity and be referred by the patient to the area of distribution of a neighboring branch or division of the trifacial. This, after a time, in its turn disappears, and a cure results. Here, probably, the central lesion involved the common origin of the three divisions beyond the Casserian ganglion, and which, upon the theory of Bell, already mentioned, became favorably influenced by the neurectomy, leading to a gradual disappearance of the pain. This was the termination in the case of S. herewith reported (Case No. 80).

In cases of peripheral origin, after neurectomy the pain will sometimes persist for a few days and then gradually disappear. This is explained by the fact that the morbid condition also involved some communicating or anastomosing twigs. As the process of degeneration goes on in these, after resection, the symptoms abate and finally cease altogether.

The question as to the permanency of the favorable results brought about by the operation of neurectomy has been frequently discussed, and the voices of equally great and eminent authorities have been raised both for and against it. Doubtless enthusiastic operators have been led to claim more for the operation than its merits deserved; on the other hand, an unfortunate experience, too small, perhaps, upon which to found an estimate of its real value, has probably often led to its unjustifiable condemnation. Like the two knights of old, one is apt to look upon his own side of the shield only, and as one happens to approach the question from the standpoint of a fortunate issue to a trial of its merits upon the one hand, or an untoward result upon the other, so are we likely to foster in

our minds either an exalted opinion of its value, or an impression of its utter inutility. Many of the older surgeons, Dieffenbach among them, considered the performance of a neurectomy as but a last desperate attempt on the part of the surgeon to relieve the victim of his terrible affliction.

Hildenbrandt¹ quotes O. Weber as having based an estimate of the value of the operation upon a study of 100 cases. Of that number, eighteen are stated to have been cured. The length of time during which these cases remained under observation is not stated.

The summary of Wagner's cases is of far greater value in this connection. This author, in his collection of 135 cases, places the number known to have been cured after a lapse of three years as eighteen. Against this apparently small number of cures he has six fatal cases to offset whatever advantage might be supposed to have accrued from the operation. Upon examining further, however, into Wagner's cases, the following facts appear: In only a single case did the relief last less than a month. In thirty-two cases the relief could be estimated in months, and for periods varying from one to three years twenty cases were free from pain. Of those cases which suffered relapse, this latter was known to have persisted up to a year following the operation in eighteen cases, and between one and three years in twenty-five cases. Besides this there were twenty-four cases known to have been completely relieved from pain, but in which, owing to the fact that the patients were lost sight of, the duration of the improvement could not be definitely stated. In the six fatal cases, occurring as they did in the pre-antiseptic period of surgery, all were due to the so-called infectious wound diseases; hence, in these days of comparative freedom from wound sequelæ, they need scarcely be taken into account.

In order to further the objects of this paper, and present whatever claims neurectomy may be thought to have upon us, as a palliative or curative measure, I have collected from various sources eighty-three cases of neurectomy; most of these having been performed since the appearance of Wagner's classical article upon this subject. These I have tabulated for purposes of study as follows:

¹Op. cit.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA.

No. of Case.	Operator.	Sex and Age.	Duration of Disease.	Date of Operation.	What Nerve.	Meckel's Ganglion removed. If so, how?	Duration of Relief.	Length of Nerve Removed.	Remarks.	Reference.
1	Carnochan.	M. 69.	5 years.	Oct. 16, 1856.	Sup. Maxillary.	Yes.	No return of pain in 14 months.	Excision to a point beyond Meckel's ganglion.		Amer. Jour. Med. Sciences. 1858. Vol. 35, p. 134.
2	Carnochan.	M. 54.	29 years.	Oct. 10, 1857.	Sup. Maxillary.	Drawn out after section, hanging to trunk.	No return of pain in 7 weeks.	2 inches.	Pain continuous for 9 years prior to operation. Division of infra-orbital nerve had been performed 3 times previously without success.	do. p. 139.
3	Carnochan.	F. 55.	6 years.	Nov. 5, 1857.	Sup. Maxillary.	Yes.	Reported at end of 1 mo.; no return at that time.	2 inches.	Subcutaneous neurectomy of branches of infra-orbital had previously given only partial relief.	do.
4	Nussbaum.	F. 38.	10 years.	Feb. 1, 1858.	Supra- and infra-orbital, inf. alveolar and mental.		5 months.	1 inch.	Relief for 5 months; then pain returned and relieved by loosening cicatrix at lower edge of orbit. Three months after pain in infra-maxillary region, trephined ascending ramus of in-	Aertizliches Intelligenz Blatt. Aug. 15, 1863.

5	do.	M. Age 3 years. not stat- ed.	March, 1859.	Supra and in- fra orbital.			2 years and 5 1 months.		Relief until May, 1862. Cica- trices cut out. Complete relief to date.	fra-maxillary and removed 4 to 5 inches of infr. alveolar, mylo- hyoid and lingual nerves. Re- lief for 9 months; neurectomy of infra- and supra-orbitals, re- moving 1 inch. In January, 1860, cicatrices removed for re- lief of pain, which had returned; 10 months relief, then great pain in whole left side of face. Patient three months advanced in pregnancy but, yielding to her enreaties, Nussbaum per- forated the antrum of Highmore and incised the nerve far back. Hæmorrhage alarming; tampon and styptics relieved this, but recurrence of bleeding necessi- tated ligature of carotid. (See case No. 1. Abstract of carotid ligations).
6	do.	F. 50.	Feb. 6, 1860.	Supra and in- fra-orbital, superficial, and deep temporal.			2 years.	Not stated.	On Oct. 8, 1862, supra and infra- orbital cicatrices cut out. Re- lief to date.	

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Meckel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
7	Nussbaum.	M. 60.	10 years.	July, 1860.	Supra- and infra-orbital.		1 year.	Not stated.	August 13, 1861, cicatrices removed. Relief 1 year. Same operation repeated Oct. 27, 1862. Relief to date.	do.
8	do.	M. 68.	22 years.	Sept., 1860.	Supra- and infra-orbital.			Not stated.	Relief partial. Trephined as in Case No. 4. Complete recovery and relief.	do.
9	do.	F. 60.	Several years.	Sept. 28, 1860.	Supra- and infra-orbital.			1/2 in.	Relief but slight. Dec. 7, 1862, tied common carotid, loosened cicatrices; resected superficial and deep temporals, etc. "Pains more endurable."	do.
10	do.	F. 38.	7 or 8 years.	Oct. 9, 1860.	Supra- and infra-orbital.				Oct. 30, 1860, trephining and resection as in Case No. 4. Relief for 2 1/2 years. May 26, 1863, cicatrices loosened and infra-orbital canal opened, as in Case No. 4. Cicatrix in infra-maxillary trephined and removed. Relief.	do.

11 do.	M. 58.	30 years.	Nov. 1, 1860.	Supra-and in- fra-orbital.			Not stated.	Relief in that region to date. do. Some pain in infra-maxillary region, but not enough to de- mand operation.
12 do.	F. 60.	Several years.	Nov. 14, 1860.	Supra-and in- fra-orbital.		1 year and 9 months.	Not stated.	Relief to date. do.
13 do.	F. 38.	9 years.	1860.	Supra-and in- fra-orbital.	Yes.		Not stated.	Following Langbeck's method of do. exposing the spheno-maxillary fossa by osteo-plastic resection of the upper jaw, Nussbaum having failed to give relief by ligating the common carotid, removed the entire nerve trunk of the superior maxillary or second division of the fifth, in- cluding Meckel's ganglion, in May, 1863. Recovery and com- plete relief.
14 do.	F. 22.	Several months.	June, 12, 1861.	Supra-orbital				No relief Aug. 20, 1861. Neu- rectomy of infra-orbital, relief incomplete. Feb. 28, 1862, trephined and resected as in Case No. 4 also removing cic- atrices of old operation. No relief March 9.
15 do.	F. 38.	Since youth.	Oct. 5, 1861.	Infra-orbital and lingual				Complete relief, slight facial paralysis. do.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Mackel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
16	Nussbaum.	M. 56.	Many years.	Mch. 6, 1862.					Relief nearly complete.	do.
17	do.	M. 46.	Several years.	July 22, 1862.	Supra-orbital and infra-orbital, trephining, etc. as in Case No. 4.				Complete relief to date.	do.
18	do.	M. 40.	Long time.	Oct. 22, 1862.	Infra-orbital.				Pain returned in 8 months. Common carotid subsequently tied. See Case No. 3, carotid ligations.	do.
19	do.	F. 24.	3 years.	Nov. 17, 1862.	Supra- and infra-orbital.	"6-8 lines."			Free from pain ever since, except do. in gums of toothless left jaw and in left temporal region.	do.
20	do.	M. 48.	Almost 5 years.	Jan. 28, 1863.	Infra-orbital.				Recovery complicated by erysipelas. Relief to date.	do.

21 J. R. Wood.	M. 42.	Several years.	April 2, 1866.	Superior maxillary.	Broken up.	No return in 2 years.	Trunk from exit for, rotund and leath of branches	Patient lost sight of after 2 years.	N. Y. Medical Journal. June, 1879.
22 Blackman.	F. 35.	14 years.	Jan. 24, 1868.	Sup. max. div. trunk from beyond Meckel's ganglion.	Yes.	20 months	Entire nerve trunk.	Infra-orbital and infra-dental removed, but in Aug., 1869, the paroxysms were as severe as ever.	Amer. Journal Med. Sciences, July, 1869, and Oct., 1870.
23 Cadja, Wm.	F. 38.	Not stated.	April, 1868.	Supra-orbital			Not stated.	Cured (?). Pain remains in temple, corresponding to superior temporal branches.	British. Med. Jour. 1882, vol. ii, p. 83.
24 Aepli.	M. 68.	14 years.	March, 1870.	Infra-orbital.		2 years and 24 months.	24 cm.		Zeitschrift f. Chirurgie. Leipsig. 1878.
25 Morton, T. G. M.	M. 60.	Not stated.	May 24, 1870.	Infra-orbital.			1 inch.	Improved.	Surg. Penna. Hosp. 1880.
26 Wood, J. R.	M. Age not stated.	5 years.	June 29, 1870.	Sup. maxillary division.	Yes.	5-7 months.	Trunk from for, rotund.	Pain returned in inf. dental nerve. A part of this was removed with relief for a time.	N. Y. Med. Jour. June, 1879.
27 Morton, T. G. F.	F. 51.	30 years.	June 17, 1871.	Infra-orbital.			Portion of trunk.	Cured.	Surg. Penna. Hosp. 1889.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Merkel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
28	Aeppli	M. 70.	2 years.	Jan., 1872.	Infra-orbital.		2 months.	Not stated.		Zeitschrift f. Chirurgie. Leipzig, 1878.
29	Dumont.	F. 59.	2 years.	Sept. 24, 1872.	Infra-orbital.		1 year.	3 cm.		Deutsche Zeitschrift für Chirurg. 1883.
30	Emmet.	F. 57.	2 years.	Sept. 24, 1872.	Infra-orbital.		1 year.	3 cm.	Subcutaneous section of infra-orbital had been done, with temporary relief.	
31	Thorndike.	M. 61.	31 years.	Jan. 3, 1873.	Sup. maxillary division.	Yes. With nerve trunk.		Trunk from foramen rotundum.	For eight years, previous to operation the pain had been almost constant. Discharged at the end of 1 month cured.	Boston City Hospital Reports, 2d series, 1877.
32	Dumont.	M. 47.	20 years.	June 14, 1873.	Infra-orbital.		8 months.	3 cm.	Pain returned in 8 months, but not so severe as before operation.	Deutsche Zeitschrift. f. Chirurgie. 1883.

33	Wood, J. R.	M. 50.	10 years.	Oct. 6, 1873.	Sup. maxillary division.	Yes.	2 years.	Entire trunk from point of section.	Previously to this operation section of the infra-orbital at infra-orbital foramen had been done, without success. Patient lost sight of.	N. Y. Med. Jour. June, 1879.
34	Cheever.	F. 65.	18 years.	Oct. 11, 1873.	Sup. maxillary division.	Yes.	2 years.	Entire trunk from point of section.	Portion of gum alveolus and superior maxillary had been removed, with relief for three months; at first pain was quite gone, then returned in other cheek, temple and lower jaw as badly as ever. Infra-orbital region free from pain.	Boston City Hosp. Reports. 2d series. 1877
35	Emmet.	F. 60.		Oct. 15, 1873.	Infra-orbital.		1 year and 2 months.	Trunk and $1\frac{1}{2}$ cm. beyond.	Nerve trunk scraped out of canal and removed from $1\frac{1}{2}$ cm. beyond.	Deutsche Zeitschr. f. Chirurgie. 1883.
36	Emmet.	F. 61.		Feb. 13, 1874.	Infra-orbital.		1 year.	Trunk.	do.	
37	Dumont.	M. 48.	2 mos.	April 30, 1874.	Sup. maxillary.	Yes, burned.	9 years.	Trunk from foramen rotundum.	The stump of nerve near foramen rotundum left after section was cauterized with actual cautery.	do.
38	Letievant.	M. 51.	5 years.	Mch. 18, 1875.	Infra-orbital.		8 days.	8 mm.	Patient left hospital. Operation done for epileptiform variety of disease. Complete relief. Patient lost sight of.	Jacquot "Der Resection, Nervenses," page 15.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Mechel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
39	Orc.	F. 51.	9 years.	July 23, 1875.	Infra and nasal infra-orbital.		8 months.		The patient had been operated on by Lande in 1872, who cut the supra- and infra-orbital nerves at their exit. Relief short. Infra-orbital was then resected in the canal.	Lyon Medical. Aug. 29, 1875.
40	Morton.	M. 42.		Aug. 20, 1875.	Supra-orbital			"Portion of trunk."	"Cured."	Surgery of Penna. Hospital. 1880.
41	Terrillon.	F. 38.	18 mos.	Aug. 1, 1876.	Inf. dental.		4 months.		Relief complete, sensation only partially returned.	Gazette Med. de Paris. 1877.
42	Fowler, G. R.	M. 53.	18 mos.	Feb. 17, 1877.	Sup. maxillary division.	Yes.	1 year.	Entire trunk from foramen rotundum.	Cured. During rest of his life was free from pain. About a year afterward died of cirrhosis of kidneys. An examination of the base of the skull at the post-mortem revealed an entire absence of any traces of an	Proceedings Med. Society, County of Kings. 1877, p. 176

43	Tillaux.	F. 31.	11 years.	May 5, 1877.	Infra-orbital.			39 days.	6 cm.	attempt at reproduction of nerve tissue. A neuroma the size of a pea was found within the cranium, springing from the superior max. nerve, at the point where it leaves the Casserian ganglion, and just previous to its entrance into the foramen rotundum.	Gazette Med. de Paris. 1877.
44	Aepli.	M. 75.	Several years.	May 5, 1877.	Infra-orbital.					"Complete relief."	Zeitschrift. f. Chirurgie. Leipzig. 1878.
45	Tripier.	M. 67.		June 21, 1877.	Sup. maxillary.			2 months or longer.	From exit back to dental branches.		Gazette Heb. de Med. et de Chirurg. 1877, p. 588
46	Dumont.	M. Age 30 years. not stated.		Feb. 13, 1878.	Infra-orbital.			2 years.	2 cm.		Deutsche Zeitschr. f. Chir. 1883.
47	Dumont.	M. 68.	5 mos.		Infra-orbital.			21 months.	4 cm.	When last heard from entirely do. free from pain.	

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR R OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Mackel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
48	Heiling.	F. 68.	2 years.	May 17, 1878.	Infra-orbital.		1 year and 2 mos.	Trunk.	Cured. No relapse to date of re-port.	K. K. Krankenanstalt in Wien. 1881
49	Michel.	M. 45.	15 years.	1878.	Infra - orbital and dental. Buccal.	No.	5 months.	2 cm. of each.	Complete relief.	Jacquot, cit.
50	Brown, A.	F. 56.	Over 10 years.	May 11, 1880.	Inf. dental.			1/4 inch.	Entire freedom from pain from date.	British Med. Jour. 1880. Vol. II.
51	Jenkins, R. S. M.	M. 52.	1 year.	Aug. 10, 1880.	Infra-orbital.		Free up to date of re-port.	Portions with branches.		South. Med. Rec. 1880.
52	Englisch.	F. 30.	8 years.	Sept. 25, 1880.	Infra-orbital.	No.		1 1/2 in.	Complete relief.	Bericht der K. K. Krankenanstalt in Wien. 1881. page 322.

53	Brok, J. B.	M. 67.	6 years.	Nov. 15, 1880.	Sup. maxillary.	Yes.				Entire trunk.	Complete cure.	Mich. Med. News, Vol. IV. No. 1.
54	Wier, R. F.	M. 47.	2 years.	Feb. 23, 1881.	Sup. maxillary.	Yes.		Free to date of report.	$\frac{3}{4}$ inch with branches.		Cured. 2 years before operation nearly an inch of sup. maxillary was resected. This was followed by constant pain for 2 months, and then followed entire relief for 6 months.	Med. Gazette. New York. 1881.
55	Morton.	M. 56.	3 or 4 years.	April 13, 1881.	Inf. dental.				Not stated.		"Excellent recovery."	Med. Times. Philadelphia 1880.
56	Morton.	M. 71.	9 years.	Mch. 21, 1881.	Inf. dental.			Free to report.	$\frac{1}{2}$ inch.		A few days after operation had 3 or 4 twinges of pain. For a month afterward and up to date of report remains well.	
57	Gerster.	M. 36.	18 years.	May 12, 1881.	Sup. maxillary.				$\frac{1}{8}$ inch.		Neurectomy in front infra-orbital foramen previously done, with but temporary relief.	N. Y. Med. Jour. Jan. 22, 1884.
58	Davis, E. P.	M. 43.	6 years.	May 28, 1881.	Sup. maxillary.	Torn out.		9 months.	$\frac{1}{2}$ inch.		Relieved until winter of 1881-82, when pain returned in infra-dental nerve and about eye.	Chicago Med. News, Vol. IV.
59	Morton.	F. 43.	5 years.	May 31, 1881.	Inf. dental.				$\frac{1}{2}$ inch.		When last heard from was free from pain.	Med. News. Philad. 1882.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Meckel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
60	Rocher.	M. 60.	16 years.	July 19, 1881.	Infra-orbital.		10 months.	4 cm.	Pains returned but not so severe. Previous to operation neurectomy had been done 5 times, 3 times with relief for 2 years, and the last with relief for 10 months.	
61	Wallace.	M. 34.	9 years.	Oct. 14, 1881.	Supra-orbital	Presumably, as nerve was removed at foramen rotundum and for 2 inches		2 inches.	Pain continued for a few days, then ceased entirely for a week, when it appeared along lower jaw, but not in portion of face previously affected.	Pittsburgh Med. Jour. Vol. II, No. 10, 1882.
62	Wallace, W.	M. 34.	9 years.	Nov. 1, 1881.	Inf. dental.		10 months.	2 1/2 inches.	Pain for a few days, then ceased. Since has been entirely free from pain except during 2 or 3 days owing to exposure to cold.	do.
63	Vanderveer, A.	F. 37.	1 year and 2 mos.	Jan. 2, 1882.	Inf. dental.		11 months.	Not stated.	Almost immediate relief.	Med. Annals. Albany, N. Y. Vol. IV, No. 9.

64 Gerster.	F. 42.	2 years.	Jan. 19, 1882.	Sup. maxillary at foramen tundum.	Yes.	1-2 months.	1 ³ / ₄ inches.	In rather more than a year after operation had slight pain in upper lip.	N. Y. Med. Jour. Jan. 12, 1884.
65 Lange, F.	M. 40.	"Long" time.	March, 1882.	Sup. maxillary at foramen tundum.	Yes.	2 years.	Trunk.	Free up to date of report.	do.
66 Gunn.	M. 44.	2 mos.	April 22, 1882	Inf. dental.			1 ¹ / ₄ inches.	Some pain for about 3 weeks after operation. Now free from pain but notices uneasy sensations during cold and damp weather.	Chicago Med. News. Vol. IV, No. 7.
67 Gerster.	M. 63.	2 years and 9 mos.	Aug. 30, 1882.	Sup. maxillary.	Yes.	2 years.	1 ¹ / ₂ inches.	Free to date of report.	N. Y. Med. Jour. Jan. 12, 1884.
68 Maclean.	M. 65.		Oct. 21, 1882.				Not stated.	Cured.	Phys. and Surg. Ann Arbor, Mich. Vol. IV, No. 2.
69 Chavasse.	M. 50.	14 years.	Oct. 3, 1882.	Sup. maxillary.	Yes.		1 ³ / ₄ inches.	Complete cure.	Med. Chirurg. Trans. Vol. LXXVII. 1884.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Meckel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
70	Maclean.	M. 64.	12 years.	Oct. 16, 1882.	Infra-orbital and ment. branch of inf. dental stretched and excised.			"Portion."	Complete cure.	Phys. and Surg. Vol. IV, No. XI, 1882.
71	Gardner, Wm	M. 65.	5 years.	Nov. 10, 1882.	Inf. dental.			1/2 inch.	Complete cure.	Australian Med. Jour. Vol. V. M. 3, 1883.
72	Chavasse.	M. 46.	11 years.	Feb. 9, 1883.	Sup. maxillary.	Uncertain owing to hæmorrhage.	Remains free.	1 1/2 inches.	Cured.	Med. Trans. Vol. LXVII, 1884.
73	Howe, J. W.	F. 45.	12 years.	May 29, 1883.	Sup. maxillary.	Yes.	Free to date, 1 year.		Slight pain when exposed to sudden changes of temperature.	Med. News. Philadelphia. Jan. 12, 1884.

74 Gerster.	M. 38.		June 16, 1883.	Sup. maxillary at foramen rotundum.	Yes.				For a few days after operation had severe pains, but patient did well, the pains not returning. Has since had slight pains in upper lip.	N. Y. Med. Jour. Jan. 12, 1884.
75 Mears.	F. 50.	8 1/2 yrs.	Aug. 27, 1883.	Inf. dental.			Free to re-3 inches. port, 1 year.			Med. News. Philadelphia. July 19, 1884. Page 58.
76 Fowler, G. R.	M. 53.	3 mos.	Mch. 20, 1884.	Sup. max. beyond Meckel's ganglion.	Yes.		1 year and 8 months, or longer.		Cured.	Med. Record. N. Y. Vol. 26. Page 369.
77 Rockwell, F. W.	F. 16.		May 8, 1884.	Sup. maxillary.	Yes.			Entire trunk.	Cured.	Annals of Surgery. Vol. 1, No. 4. April 1885.
78 Fowler, G. R.	M. 45.	3 years,	Nov. 3, 1884.	Sup. maxillary.	Yes.			Entire trunk.	Cured. Had pain, slowly lessening and referred to infr. max. division. This disappeared by Jan. 1st.	Records of St. Mary's General Hospital. Brooklyn, N.Y. 1885.

TABULATED STATEMENT OF CASES OF NEURECTOMY FOR RELIEF OF FACIAL NEURALGIA. *Continued.*

<i>No. of Case.</i>	<i>Operator.</i>	<i>Sex and Age.</i>	<i>Duration of Disease.</i>	<i>Date of Operation.</i>	<i>What Nerve.</i>	<i>Meckel's ganglion removed. If so, how?</i>	<i>Duration of Relief.</i>	<i>Length of Nerve Removed.</i>	<i>Remarks.</i>	<i>Reference.</i>
79	Fowler, G. R.	F. 30.	For several yrs. at intervals.	Feb, 4, 1884.	Supra-orbital		1 year and 9 mos. from operation (present date) remains well.	Supra-orbital back of supra-trochlear branches distributed to the forehead.	Cure. Pain ceased at once and has not returned up to present date, Nov. 1, 1885.	Med. Record. N. Y. Vol. 26, p. 359.
80	Fowler, G. R.	M. 38.	20 years.	Nov. 13, 1884.	Sup. maxillary.	Yes.		Trunk beyond Meckel's ganglion.	3 years before facial nerve had been stretched, and relief for one week. After the operation here recorded immediate relief of pain. On 7th day left hospital, the sutures still remaining in situ, in spite of remonstrances of my house surgeon. On the 17th day after leaving hospital word was received at the institution that he had died of tetanus, which developed a few days before. The day he left the hospital was damp and cold.	Records of St. Mary's General Hospital. Brooklyn, N.Y. 1885.

81 Croft.	Sex not stated.			Infra-orbital and stretched.				$\frac{3}{8}$ inch.	For a time pain and muscular spasms persisted, then subsided and he was free from pain. 6 months later had an attack of gout, which was followed by convulsive neuralgia, which also subsided. After another 6 months the pain again returned, and to it succeeded permanent relief.	
82 Markoe.	M. Age not stated.			Sup. maxillary and part of branch to Meckel's ganglion.	No.	3 years.		Trunk.	Neurectomy of infra-dental previously. In 3 years supra-orbital neuralgia appeared, but not severe.	N. Y. Med. Journ. Jan. 12, 1884.
83 Bull, W. T.	M. 62.	Several years.	Aug. 11, 1884.	Sup. maxillary.		15 months (to $\frac{3}{4}$ inch date).		$\frac{3}{4}$ inch.	One week after $\frac{3}{4}$ inch of inf. dental nerve was removed. Relief up to date.	N. Y. Med. Journ. Nov. 28, 1885.

The facts as here presented, although they do not bear out the brilliant anticipations once held as to the future of neurectomy, yet are such as to give surgeons quite as much confidence in this as in other operations when but a remote hope of cure can be held out, and which must be necessarily but palliative in the large majority of cases. Operations for carcinoma are not withheld from patients when periods of relief varying from one to three years can be promised, and no surgeon would be justified in refusing to operate, other measures of relief failing, upon the victims of this source of terrible suffering. Any one who has witnessed the contortions and grimaces of the muscles of expression upon the accession of a paroxysm of pain in one of these cases could not fail to have his deepest sympathies excited in behalf of the sufferer; any method of dealing with such agony, which, by a single stroke could palliate its fierceness and hold it in abeyance, if but for a brief period, is worthy of trial. In this sense alone neurectomy in properly selected cases is not only justified, but most imperatively demanded. The question as to whether it should be performed at once, or constitute the ultimate refuge of the tormented victim may not yet be settled, but that it holds out hope for the otherwise hopeless no one can deny.

It is not my intention to treat of the special operative technique of neurectomy, but there is one method of operation for which the application of a special principle is claimed, and which calls for more than a passing notice. I refer to the operation of neurectomy of the superior maxillary or second division of the fifth, with extirpation of Meckel's ganglion, instituted by Carnochan.

In a most able article upon the subject of the importance or otherwise of removing Meckel's ganglion for the relief of neuralgia of the fifth cranial nerve, Prof. Conner¹ reviews the subject of the anatomy and physiology of the parts involved in the so-called "Carnochan's operation." Basing his conclusions upon a study of thirteen cases reported up to the time of the appearance of his paper, he concludes that, inasmuch as freedom from pain did not continue more than a year and a half

¹ American Journal of the Medical Sciences, October, 1870. Page 359.

after removal of the ganglion, simple neurotomy (?) gave a period of relief as great, or nearly so, as those in which the ganglion had shared in the excision. Prof. Conner evidently has not separated the cases operated upon by nerve section from those in which a neurectomy had been performed. He quotes Wagner and others as having given periods of relief ranging from eight to fourteen months by excising portions of the nerve trunk ranging from "eleven to eighteen lines and a half." These were cases of neurectomy and should be classed as such.

There can be no question that Carnochan's assertion that the removal of the ganglion constitutes the "key of the operation," was founded upon insufficient observation; and his assertion that this collection of gray matter could be with propriety likened to a galvanic battery, keeping up a continual supply of "morbid nervous sensibility," is hardly to be considered as being founded upon a proper appreciation of the function of this ganglion. Prof. Conner has so ably set forth the other objections to a performance of this part of the operation, except as a means of assuring the total excision of the nerve to the foramen rotundum, that theoretically, at least, it would seem, if the nerve and all of its branches could be excised in cases in which the disease was of peripheral origin, and the sphenopalatine ganglion remained undisturbed, that a more rational procedure would be substituted for a formidable operation, and, in the case of the latter, one not free from danger. But the impossibility of achieving a neurectomy of the entire nerve, including the palatine and posterior dental branches, without sacrificing the ganglion, will be apparent at a glance, when the very narrow space through which the foramen rotundum is reached and the difficulty, owing to insufficient light, of identifying the parts satisfactorily, are taken into consideration.

From the table of neurectomies, I have separated twenty-six cases of excision of the infra-orbital or superior maxillary division of the fifth nerve in which the sphenopalatine ganglion was either removed, broken up or otherwise destroyed, for purposes of study and comparison. These include cases numbered 1, 2, 3, 13, 21, 22, 26, 31, 33, 34, 37, 42, 53, 54, 58, 61, 64, 65, 67, 69, 73, 74, 76, 77, 78 and 80. In summarizing these cases

the following points are presented for consideration. In the first place it will be at once seen that the cases subjected to this method of operating were by no means trivial in character. The average duration prior to operation was certainly as long, and the ages of the patients and other circumstances were of a character as unfavorable to recovery as in the other cases of excision of the infra-orbital nerve in which a more or less extensive neurectomy was performed, but without removal of the ganglion.

1. Total number of cases in which Meckel's ganglion was removed, 26.
2. Number of cases in which relief continued for three years or longer, 3.
3. Number of cases in which relief continued for two years but less than three years, 6.
4. Number of cases in which relief continued for one year but less than two years, 9.
5. Number of cases in which relief continued for six months but less than one year, 3.
6. Number of cases in which relief lasted less than six months, 5.
7. Average duration of relief, one year, five months, sixteen days.

From the same table twenty-six cases of simple neurectomy of the infra-orbital nerve or superior maxillary division have been taken including cases numbered 15, 18, 20, 24, 25, 27, 28, 29, 30, 32, 35, 36, 38, 40, 43, 44, 46, 47, 48, 51, 52, 57, 60, 70, 81 and 82 and 83. These are of about the same average duration and severity; certainly no partiality can be said to have been shown in these respects towards the first series of cases; the results of a study of these cases may be summarized as follows:

1. Total number of cases of neurectomy of the infra-orbital nerve, 26.
2. Number of cases in which relief continued for three years or longer, 5.
3. Number of cases in which relief continued for two years but less than three years, 3.
4. Number of cases in which relief continued for one year but less than two years, 7.

5. Number of cases in which relief continued for six months but less than one year, 7.

6. Number of cases in which relief lasted less than six months, 4.

7. Average duration of relief, one year, three months, fifteen days.

In thirteen cases the entire nerve trunk was removed from beyond Meckel's ganglion. In three cases the proximal nerve was removed for more than an inch from the foramen rotundum, and less than the entire trunk. In one case less than an inch, including the ganglion, was excised. In four cases the length of the nerve trunk removed, besides the ganglion, was not stated. As a rule, the longer periods of relief after the operation are among those cases in which the entire nerve trunk was removed from beyond the ganglion. On the other hand, the question as to whether this longer duration of relief depended upon the removal or destruction of the ganglion, or the fact that a more extensive neurectomy was done in these cases, is still an open one. No satisfactory estimate can be made as to the duration of relief in these cases, for the reason that the reports are sometimes made within a few months after the operation. How many of these continue up to the present time free from pain, upon the one hand, or upon the other, relapsed after being reported as cured, it is impossible to say.

Physiologists now consider the sphenopalatine ganglion, as well as the other three cranial ganglia as belonging to the sympathetic system. This is the largest of these and receives its sensory root from the fifth, through the sphenopalatine branches of the superior maxillary division. The branches of distribution of the ganglion, like those of the sympathetic generally, are distributed largely to mucous membrane. The gums, hard and soft palate and nasal cavity are supplied by this distribution. These are the situations most exposed to influences provocative of attacks of pain: and it is thought that through this distribution are to be explained those cases in which attempts at mastication and deglutition produce the paroxysms. This of course, would imply a diseased condition of the ganglion itself, and that too, perhaps, by means of continuity and extension from the fifth, through its sensory roots. It is

difficult to understand how this could occur when the difference in structure in the nerve fibres on the one hand, and the nerve cells of the ganglion, which latter resembles those of the encephalon, upon the other, are taken into consideration. That the sympathetic system is endowed with sensibility is now generally conceded, although it must be acknowledged that this is not present in so high a degree of development as in the case of the cerebro-spinal system. The ganglion itself may not be possessed of great sensibility, for both Claude-Bernard and Prevost have torn it out without producing apparent pain: yet it may serve as the medium through which impressions are reflected and produce their effect upon the sensorium. The history of one of my cases seems to point particularly to an extremely sensitive condition of the area of distribution of the branches from the ganglion upon the mucous membrane. The case was that of a Swede, (No. 80 of the table) who, for twenty years had suffered from a neuralgia referable at first to the distribution upon the face of the infra-orbital. Later on, the mucous membrane lining the nose, mouth and hard and soft palate became so exquisitely sensitive that he could not bear the slightest impression. Every attempt to receive food upon that side of the mouth was followed by exacerbations of pain of the most frightful character. It was only by lying upon the opposite side and having a funnel passed back to the pharynx so as to guide the stream away from the diseased side, that he was enabled to take food at all, and that of a liquid character only. It is fair to say that impressions, however slight, such as, for instance, that of a fly alighting upon the surface of the integument in the area of distribution of the infra-orbital nerve, would likewise initiate a similar attack. The removal of the nerve and ganglion in this case at once and completely arrested the symptoms, and although he perished afterwards through his own temerity and fool-hardiness, for the balance of his life he experienced immunity from pain such as he had scarcely known within his recollection.

In any event, it seems rational to conclude that the neurectomy should be sufficiently complete to include as much of the nerve as possible. Hueter¹ states that experiments made

¹Grundriss der Chirurgie, Vol. I, p. 444.

upon the lower animals demonstrate that it is necessary in them, to include a portion of the nerve not less than five inches in length, in order to prevent, with certainty, reunion. It is manifestly impracticable to remove so large a portion of the nerve trunk in the case of the branches of the trifacial, and therefore, some other means of achieving the same result would be very desirable. Hueter suggests that bruising the ends of the nerve stumps might answer, but fears that an ascending neuritis might be set up, which, extending to the central organ, might there set up changes, which, in their turn, would be the cause of a repetition of the neuralgia. The suggestion that touching the central end of the nerve stump with the point of the thermo-cautery might be of service, both in preventing reunion, as well as controlling to some extent the resulting neuritis, seems to be a good one. This was stated to have been done in at least one case recorded in the table (Dumont's, No. 37).

NERVE-STRETCHING.—This operation is a comparatively modern method of treatment of neuralgia. The credit of having been the first to suggest it is generally ascribed to Billroth¹, who, in 1872, related a case of epileptiform attacks which were thought to have their origin in an injury to the right sciatic nerve near the tuber ischii, and which he cured by laying bare the nerve for upwards of eight inches and stretching it at several points. Prof. von Nussbaum², of Munich, however, reduced the procedure to a methodical operation as applied to neuralgia. The cases in which it would seem to have had its greatest applicability are those in which the large nerve trunks are involved, such as the sciatic, although it has not been confined to such cases. It is not easy to estimate, at the present time, its precise value in cases of neuralgia of the trifacial. In this, as in all other measures for the relief of the class of cases under consideration, the length of time which improvement lasts, or immunity from pain continues, enters as a very important factor in the study of the subject. For this reason a neglect to state how long patients, designated as cured, were kept under observation, has invalidated many of the cases thus

¹Archiv. f. klinisch. Chirurgie. XIII, p. 379-395.

²Deutsche Zeitschrift für Chirurgie. 1874.

far collected. This is notably true of the cases tabulated by Dr. Chandler¹, and also of those collected by Dr. Harte for Prof. Agnew². Every one is familiar with the fact that the most surprising arrest of the pain of facial neuralgia will follow decided impressions upon the mind, but cases apparently benefited by purely psychical influences very rarely continue improved, and in a comparatively short time relapse into their old state. It is equally well known that all therapeutic measures may do well for a time, but a tendency to relapse is the rule. In the absence of any reliable data upon which to base a rational theory as to the action of this operation, and even taking into account the short space of time during which improvement continues in many cases where the operation has been performed upon the sensory branches of the face, it will still be necessary, perhaps, to look further than a psychical effect to account for the brief period of rest. In the case of the larger nerve trunks, where a much greater exercise of force would be justifiable, as for instance, in the sciatic, one can easily see that the traumatism inflicted might lead to a degeneration, in a greater or less degree, of some of the nerve tubules or a molecular change extending to the central organs of the nervous system. Here, doubtless, the effects of the stretching are felt by the nerve for a much greater distance than could be possible in a nerve like the supra-orbital, for instance, which would give way before the stretching could influence the parts beyond the immediate vicinity of the point laid bare in the operation wound.

Hahn,³ of Berlin, stretched, in eleven consecutive cases, one or another of the branches of the fifth nerve for neuralgia. Eight of these, although apparently cured, relapsed after six or eight months, yet had they been reported within half a year from the time of operation, all would have doubtless been set down as cures. Of the three remaining cases, two are reported by him as failures from the beginning, and the third remained improved, although not cured. In this latter case, it is worthy of note, the nerve was resected, as well as stretched,

¹Medical Record, New York.

²Principles and Practice of Surgery Vol. III p. 413.

³Chandler's Tables.

and it is fair to assume that the improvement may have been due, in some measure, to the neurectomy. To sum up this operator's experience in nerve-stretching, as applied to the divisions of the fifth, it may be said that he gave eight of his patients more or less immunity from pain for periods of time the longest of which did not exceed eight months, while in two no relief followed; in one case, although complete relief did not take place, yet a permanent improvement, which might have been due to the conjoined neurectomy, resulted.

Another case, that of Croft, also to be found in Chandler's tables, and reported as cured by nerve-stretching, was subjected to the operation of neurectomy in addition to the nerve-stretching, and the result may have been favorably influenced by the cutting operation. It should also be noted that this is the only case reported in this tabulation of cases in which the statement that a cure took place was based upon an observation of the patient for more than a year after the operation. This fact, taken in connection with Hahn's relapsed cases, is of especial significance. In all the other cases quoted by both Chandler and Agnew, in which the length of time the patient remained under observation was noted, the longest did not exceed seven and a half months. With the well-known tendency to relapse in these cases, no patient should be considered as cured until at least the average time during which relapses takes place, has passed.

Turning now to the tables of Dr. L. C. Gray¹, who endeavored to glean from the numerous articles upon the subject data sufficient to base an opinion upon the value of nerve-stretching in chronic trigeminal neuralgia, we find the cures tabulated in such a manner as to lead one, at first glance, to form a rather favorable opinion of the operation. But it will be at once seen that the only case sufficiently complete in its history to be at all worthy of consideration as a case cured, is that attributed to Spence. In this case the patient was reported to be free from pain eight months after the operation. The remaining seven cases were only under observation for periods ranging from three weeks to two months. Referring

¹ *Journal of Neurology and Psychiatry*, May, 1882.

to his table the author very pertinently observes: "It is claimed that all these were cured; but in only one case is there positive proof of this statement," alluding to the case of Spence.

Upon the introduction of nerve-stretching it was thought that, for neuralgia of the fifth, of central origin at least, the excision of the nerve would be held in reserve for cases in which the lesser operation failed to give relief. It would therefore seem a rational proposition to make trial of all other measures, including nerve-stretching, and if these fail to give relief, then the performance of a neurectomy would certainly be indicated. It is probably a fact that most operators, in those cases in which an excision of a portion of the nerve only was performed, made more or less traction upon the nerve with the view of bringing as much of the nerve trunk as possible within reach, thus unconsciously performing a nerve-stretching, as well as a neurectomy. This has been particularly true of operations of excision of the infra-orbital nerve at its emergence from the infra-orbital foramen, as well as of the inferior dental at the mental foramen, and the inferior maxillary, when the method of either Kühn or Hueter is employed. In the case of the latter trunk, particularly, it will be found, if the experiment be made upon the cadaver, that a considerable dragging in an upward direction is necessary in order to bring the nerve into position to be readily reached and excised from its position within and behind the angle of the lower jaw. In the cases in which excision of the inferior dental nerve has been done in some part of the inferior dental canal, after opening the latter, in order to excise as much as possible of its trunk it is advised to make forcible traction upon the same. The trunk has been torn off in this attempt, and it seems to be not altogether improbable that the influence of the forcible stretching which this manipulation involved was felt along the whole course of the nerve trunk. According to Hildenbrandt¹, this accident occurred to no less careful an operator than Sedillot. In fact, this forcible traction upon the nerve occurs in almost all of the commonly performed neurectomies upon the tri-

¹ *Nervendendehnung, Neurektomie und Nervennaht. Berlin. 1884*

facial, whether upon the supra-orbital by Leinhart's method; the infra-orbital by Wagner's operation of making strong tension upon the nerve before making the section close to the bone; or in neurectomy of the lingual, in which the nerve is caught upon a strabismus hook and brought well into view before the section is made. Hansen¹ recommends forcible extension upon the spinal accessory prior to an excision of a portion of its trunk, and P. Vogt² proposes to combine nerve-stretching and neurectomy as a formal operation in properly selected cases.

The above facts forcibly suggest to the mind of the practical surgeon the possibility of achieving as good a final result from nerve-stretching, either with or without a conjoined neurectomy, as from the operation of neurectomy of the entire nerve trunk, where accessible. Further experience in nerve-stretching may serve to confirm this, and it is suggested that, as the operation becomes more extensively practiced, and cases are recognized in which it alone is applicable, and which are submitted to it, it will be found to possess advantages which will place it among recognized operative measures for the relief of this class of sufferers. I venture to predict, however, that the greatest barrier to its frequent performance upon the tri-facial, compared to its application to the sciatic will be found in the anatomical difficulties in the way of exposing more than a comparatively small portion of the trunks of the divisions of the fifth nerve without considerable mutilation of the face. To the patient the operation will seem as grave a matter as neurectomy itself, and, in fact, it is quite as serious an undertaking, if sufficient of the nerve is exposed to make the operation complete and effectual.

CAROTID LIGATION.—The arrest of arterial blood supply, as a means of cutting short paroxysms of trigeminal neuralgia was practiced by Trousseau. His plan was to first perform an arteriotomy, in the case of small vessels, such as the temporal and occipital, and to subsequently employ compression. He is said to have met with some brilliant successes by the employment of this method, particularly in neuralgias of the

¹Arch. de Physiol. norm. et path. Paris. 1881.

²Hildenbrandt, Op. cit.

nerves of the temporal region and scalp. Von Nussbaum¹, however, in 1858, after having performed various neurectomies and other operations for the relief of an intractable prosopalgia without avail, was compelled, on account of persistent hæmorrhage, resulting from one of these latter, to place a ligature upon the common carotid of that side. The patient, a pregnant female, perished from recurrent hæmorrhage from the wounds, after aborting, but von Nussbaum seems to have been so encouraged by the suggestion of the possibility of favorably influencing the neuralgia by this procedure that he repeated the operation in four other instances. That success should have attended these efforts is not a matter of surprise, when the decided changes, occurring both in the nerve trunks together with their distribution, and in the central organs of the brain, through arrest of the nutrient supply, are taken into account.

The following abstracts of cases of ligature of the carotid for neuralgia of the trifacial have been compiled from the published reports of cases occurring up to this time, accessible to me :

CASE I². F., æt. 38. Duration ten years. February, 1858, removal of one line of supra-orbital, infra-orbital, inferior alveolar and mental nerves. Relief.

July.—Pain again, relieved by loosening up the cicatricial tissue at lower edge of orbit. October.—Pain in inferior maxillary region. Trephined the ascending ramus of the inferior maxillary bone and removed four to five lines of inferior alveolar, mylo-hyoid and lingual nerves. Relief for nine months. Pain returned. Supra- and infra-orbitals again divided, removing one.

January 1860, the cicatricial tissue formed by trephining was removed. Ten months' relief. Then great pain on whole left side of face. The patient was three months advanced in pregnancy.

October 29, 1860.—Yielding to her urgent entreaties, the cicatricial tissue was removed from the scars of the previous operations, a triangular piece cut out from the superior maxillary, opening the infra-orbital canal and incising the nerve far back. Bleeding from this and from lower jaw was excessive, yielding to styptics and tamponing the wounds.

¹Aertzliches Intelligenz-Blatt, vol. x., p. 461.

²Von Nussbaum. Article by Bratsch, *Aerzialiche's Intelligens-Blatt*. August 15, 1863, vol. x., p. 461.

October 31.—Hæmorrhage renewed.

November 2.—Ligated common carotid. Patient free from pain and appeared to improve.

November 3.—Miscarriage.

November 4.—Hæmorrhage recurred in wounds and the patient died.

CASE II¹. F., æt. 22. Several months' duration of disease.

June 12, 1861.—Resection of one inch of supra-orbital. No relief.

August 20.—Cut out scar and resected infra-orbital. Relief incomplete.

February, 1862.—Accessions of pain with opisthotonos.

February 28, 1862.—Cut out scars, trephined and resected, as in preceding case. Quick recovery, but no relief.

March 9, 1862.—Tied common carotid. Relief complete. Slight paresis of extremities on affected side for fourteen days, disappearing when temporal pulsation returned.

CASE III². M., æt. 40. Duration for a long time—beyond memory of patient, who is mentally deficient.

October 22, 1862.—Resection infra-orbital. Pain recurred in eight days.

October 30, 1862.—Tied common carotid, loosened cicatrix of infra-orbital, resected supra-orbital and temporal, and performed the trephining and resection as in case No. 1.

Patient lay eight days in stupor, suddenly returned to consciousness, free from pain. Twelve hours after operation complete paralysis of left side was noticed. This continued for four weeks, when sensation returned; then, by degrees, motion. Complete relief. Is able to walk long distance. No return of paralysis or improvement in intelligence.

CASE IV³. F., æt. 38. Duration, nine years. In 1860—Supra- and infra-orbital cut several times. Infra-orbital at last resected.

June 25, 1861.—Cicatrices cut out. Relief incomplete.

January 13, 1862.—Cicatrices again cut out. Relief for several months.

November 8, 1862.—Common carotid ligated. No result.

November 29, 1862.—Cicatrices cut out. Slight relief.

CASE V⁴. F., æt. 60. Of several years' duration.

¹ Bratsch. *Op. cit.*

² Bratsch. *Op. cit.*

³ von Nussbaum, reported by Bratsch, *op. cit.*

⁴ von Nussbaum, reported by Bratsch, *op. cit.*

September 28, 1860.—Resection one-half supra- and infra-orbital and occipital. Relief but slight. Bitter taste in mouth.

December 7, 1862.—Tied common carotid, loosened cicatrices, resected superficial and deep temporals, trephined and resected as in Case No. 1. Pains more endurable and confined to a spot over the right temporal bone.

CASE VI¹. F., æt. 56. Of many years' duration. In 1853, a period of relief, covering six years, was obtained by a neurectomy of the right infra-orbital. Then neurectomy of the left infra-orbital was done. In six years recurrence of pain, for which inferior dental was excised and mental foramen cauterized. Six months' relief followed this.

April 9, 1866.—Ligature of left carotid. Ligation revealed athroma at the bifurcation. Complete relief. (Case reported eleven days after operation).

CASE VII². F. Mother of five children. Healthy up to 37th year. Then rheumatic affections. Subject to many great changes of temperature in her daily duties as mistress of an inn. Section infra-orbital (1851?).

Relief for fourteen years. In 1865 recurrence in mental, infra-maxillary and infra-orbital of other (left) side. Excision of these. Only temporary relief. Tied carotid September 14, 1865. Complete relief from neuralgia. Troubled with rheumatism in bad weather. Patient died in 1876 from carcinoma. Autopsy refused.

CASE VIII³. M., æt. 45. Duration of ten years with intermissions. Removal of a molar tooth from upper jaw gave relief for three weeks, Gross' operation of exsection of the alveolar process, done in 1871, gave relief for five months. A neurectomy of the inferior dental gave relief for three years—carotid ligated June 30, 1877. This is the third time this patient has been reported cured.

CASE IX⁴. M., æt. 41. Professor Salzer operated by neurectomy of infra-orbital in 1870. Recurrence in eight months. Ligation carotid May 14, 1871. Temporary relief. Recurrence in eight months. Patient found relief from chloral hydrate. Thought to obtain more relief, so took three ounces at one dose. An antidote was immediately given. The toxic symptoms were checked, but hyperæmia of the left conjunctiva and panophthalmia set in. Rapid keratitis and loss of

¹ Patruban, K. K. *Gesellschaft der Aertze in Wien*, April 20, 1866.

² Patruban, Allg. *Wiener Med. Zeitung*, Nov. 28, 1876, XXI, pp. 421, 429 and 442.

³ Hutchison, *Med. News*, Phila., April 11, 1885.

⁴ Patruban, Allg. *Wiener Med. Zeitung*. 1876.

sight in thirty-six hours. This was on the side where the ligation occurred. The author suggests that the inflammation was caused by defective functional activity of the vaso-motor nerves, which was probably an effect of the previous ligation. Since the loss of that eye the patient has felt only occasional "reminiscences" of pain, easily controlled by hypodermics of morphia.

CASE X¹. F. Age not given ("young and blooming"). Always healthy and strong; in 1870-'71 troubled with hyperæmia of right side of face, with feeling of heat and dryness. This was followed after awhile by boring and darting pains along branches of the fifth nerve. This was accompanied by injected conjunctiva, lachrymation, tinnitus, slight salivation and muscular twitching, and a hyperæsthesia so great that the slightest touch to the skin or confinement of a bandage or even placing the tongue to the lips brought on accession of neuralgic pain. Operation December 24, 1871. Instant and complete relief to date.

CASE XI². F., æt. 32, wife of an officer. Had accompanied him in Italian campaign of 1859, contracting by exposure rheumatism. Infra-orbital neuralgia right side. Neurectomy. Fourteen months' relief. Neuralgia of infra-maxillary. Neurectomy (Paravicini's method), two years' relief. Diffuse neuralgia. Hyperæmia of face and scalp, followed by puffiness and circumocular œdema. Ligation of carotid. complete relief.

CASE XII³. F., æt. 63. Without prodromes, commenced in 1863 to have tearing pains in right jaw. Drawing teeth did not alleviate. Neurectomy of infra-orbital. Relief for nine months, then return of pain in supra-orbital and infra-maxillary nerves of that side. No painful points. Ligated carotid. Relief for four years. Then recurrence, but in milder form. Subcutaneous injections relieved the pain somewhat, but it was associated with spots of local hyperæmia. Scarification of these gave sufficient relief so that the patient could chew and swallow.

CASE XIII⁴. (Described also by Prodratzky in his work on neuralgia, as he saw the patient).

M. Young soldier, contracted rheumatism in 1859, whence infra-orbital-neuralgia. Resection. One year later, recurrence. Repeated resections were unavailing. Ligation carotid. The operation was very difficult, the anæsthesia incomplete and the patient struggling

¹ Patruban. Op. cit.

² Patruban. Op. cit.

³ Patruban. Op. cit.

⁴ Patruban. Op. cit.

throughout. Recurrence after thirteen months. Repeated resections of cicatrices of no avail.

Podrazky operated after Carnochan's method, cutting the nerve at the foramen rotundum. An immediate examination of the resected nerve showed no pathological changes worth noting. The operation was quickly recovered from, but gave only temporary relief.

CASE XIV¹. M. In 1872 cut infra-maxillary by Paravicinis' method (denuding posterior border of ascending ramus of infra-maxillary, sawing off a plate of bone on inner side with fine saw so as to reach the infra-orbital canal, isolating and resecting nerve). Recurrence in one year in all branches of fifth. Ligation of carotid. The operation affected the patient so little that on his afternoon visit, six hours after operation, he was found drinking coffee and playing cards with some friends in a neighboring coffee house. Recurrence in eleven months, on same side. Resection at foramen rotundum. Complete relief. After a year had some slight variable pains from time to time. Lost sight of since.

CASE XV². M. Capuchin monk. In June, 1866, stated that he had had neuralgia for eight years. Hyperaemia and local burning right side face. Then boring and tearing pains of so great severity as to cause him to swoon while officiating at mass or confessional. Then hemicrania and twitching of muscles of face. He supposed the affection to be caused by exposure to cold in the cloister or refectory. Determined upon tying carotid, and advised him to go to hospital for the purpose. He preferred to remain in a cell of the cloister. Operation at physician's residence, thence removed to cloister six hours after operation. Visited him next day and found him doing well; was obliged to leave him for five days, when was astonished to find that erysipelas had set in and that pyæmia was imminent. The patient stated that he had been lying neglected in his cell and could scarcely obtain a drop of water. Although the weather was warm it was at the time favorable to the healing of wounds, as the many cases of wounded soldiers then in the city amply showed. The cleansing of the wound had been too long delayed. Patient died.

CASE XVI³. M., æt., 49. Disease of thirty years' duration. Carotid ligated June 10, 1878. No cerebral symptoms. No relief to pain. A subsequent neurectomy of infra-orbital gave two and a half months' relief. Pain returned in inferior maxillary division.

CASE XVII². M., æt. 64. Prosopalgia right side. First attack in

¹ Patruban. Op. cit.

² Patruban. Op. cit.

³ Hutchison. Op. cit.

⁴ F. H. Gross, *American Journal Med. Sciences*, April, 1883, vol. 85, p. 366.

August, 1873. Extraction of decayed teeth and hypodermics of morphia. Relief for three years. A second attack in 1876, which lasted three months, and slowly yielded to electricity. In June, 1880, a third attack. Compression of carotid gave relief. Ligation August 9, 1880. Immediate relief in area of distribution of first and second divisions. Pain has never returned in the first division. Second division remained free for fully two years. The effect on third division "too transient to count for anything." Neurectomy of inferior dental eight months later, resulting in relief for a year and a quarter. Then neurectomy of superior maxillary and repetition of last operation. Relief complete. Patient seen in February, 1883, at which time he was still free from pain.

CASE XVIII¹. Left parotid a tumor, which was thought to be the seat of an intense neuralgia, associated with converging strabismus and deafness. Tumor removed. Partial relief. Strabismus and deafness not affected by the operation. During the second month following operation pain returned, when it was accidentally discovered that pressure on the left carotid stopped the pain. Vessel ligatured below the omo-hyoid. Operation in 1873. Patient reported in following year as being cured.

An analysis of cases operated upon by ligature of the common carotid, with special reference to duration of relief gives the following:

Number of cases in which duration of relief exceeded three years, four; number of cases in which relief lasted between one and three years, three; number of cases in which duration of relief was less than one year, four; number of cases in which only partial relief followed operation, one; number of cases in which no relief followed operation, two; number of cases in which death was attributed to operation, one; number of cases reported cured, but in which duration of relief could not be ascertained, two.

Longest period of relief, eleven years; shortest period of relief, two months.

Among the fatal cases I have not included that of von Nussbaum, for the reason that the death did not occur as a result of the operation, but from a recurrence of the hæmorrhage, for the arrest of which the operation was resorted to. It is

¹ L. C. Lane, *Trans. Med. Soc., California*; *Am. Journal Med. Science*, October, 1884; Wyeth, p. 62.

questionable whether the case should find a place at all in this list; but it is introduced for the purpose of calling attention to some of its very interesting features.

It should be remembered that many of these cases, reported as completely cured, may be still living and continue free from the malady.

Hueter¹ credits G. Fischer with having reported fifty-four cases, but upon investigation I find that the article there referred to is a report of fifty-four cases of ligature of the carotid for *nervous diseases*.² Thirty-four of these were cases selected from a collection of 600 cases of ligature of the vessel, by Pilz.³ Twenty-three of this series of thirty-four cases were done for epilepsy. Fischer, in a foot note, states that Pilz had privately shown him a list of 300 more cases of carotid ligation, and it is presumed that the balance of the fifty-four cases, twenty in number, were made up from this list. How many of this latter were for trifacial neuralgia it is impossible to say, as Fischer classes them all together as cases of tying the carotid for "nervous disorders." Of the thirty-four cases taken from the published list of Pilz, the following comprises those which can in any manner be said to relate to the subject under study and which are not included in the preceding:

LISTON. June 22, 1817. Female, æt. 24. "Headache." Persistent pain in left cheek and upper jaw, spreading over entire face. Compression of carotid gave some alleviation. Result: Operation gave no permanent relief. (*Edinburg Med. and Surg. Journal*, 1820, p. 66).

KRIMER. Male, æt. 48. "Headache." Result: Alleviation. Patient died thirteen months after the operation. Autopsy revealed an aneurism of the arch of the aorta and dilatation of the right auricle. Brain anæmic.

(Kleinert Report. 1830, Heft 9, s. 124, aus. *Hohnbaum und Jahn's Med. Conversationsblatt*, Jassgang 2, No. 16, s. 121-125).

PRESTON. 1831. Male, æt. 24. Partial paralysis and headache. Result: Temporary relief. The patient seems to have had some

¹*Grundriss der Chirurgie* 1880, Specieller Theil, p. 333.

²G. Fischer. *Krankheiten des Halses*, 1880. Lieferung 34, *Deutsche Chirurgie*, p. 59.

³Pilz. *Archiv. für klinisch, Chirurgie*, IX, Berlin, 1868.

amelioration of the paralysis, as well. (*Trans. Calcutta*, vol. vi., p. 394).

PARSONS. 1846. Male, æt. 19. Headache, remittent in character, of two years' standing. Result: No permanent relief. Abatement for some weeks. Patient died in a few months; cause of death not stated. (*Am. Jour. Med. Science*, April, 1848, p. 360).

In a recent article upon ligature of the common carotid for trifacial neuralgia,¹ the writer refers to this collection of fifty-four cases by Fischer, quoted by Hueter, as if they were all for trifacial neuralgia. Another writer had previously fallen into the same error². Hueter says: "Occasionally attempts have been made to heal neuralgia of the trigeminus and similar nervous disorders by ligatures of the common carotid." Further on he states that "the above mentioned statistics contain fifty-four cases of this sort."

The mortality of the operation of ligature of the common carotid is much lower in this class of case as compared to that which follows ligature of the vessel for aneurism. According to Hueter who bases his estimate upon the cases reported by Fischer, a fatal result, due to the operation itself, occurred in 5 per cent of the whole number. Prof. J. A. Wyeth³, of New York, in a summary of 789 cases in which the common carotid was tied for all causes, states that 323, or 41 per cent, died. Although the operation, as applied to the relief of neuralgia is of comparatively recent introduction, and the number of cases reported thus far is relatively small, yet we would naturally expect much better results from its application to this class of cases, than in those in which it is resorted to for disease arising from degenerative changes in the vessel or its branches. The mortality although seemingly low, yet is not sufficiently so to warrant its performance in this class of cases until all other, and less grave measures, have been tried and found to be futile. Again, the prognosis regarding the disturbances of the cerebral functions are to be taken into account. Hemiplegia with or without aphasia, facial paralysis, paralysis of the opposite

¹*New York Med. Journal*, April 11, 1885.

²*Am. Journal Med. Sciences*, April, 1883.

³*Essays in Surgical Anatomy and Surgery*, New York, 1879.

arm, delirium, convulsions, and other minor disturbances, such as headache, occur in at least 7 per cent of cases operated upon for all causes¹. In all probability, as has been suggested by Wyeth, a much larger proportion of cases develop these symptoms than at first glance would appear. According to the tables of the latter, at least three-fourths of the cases in which symptoms of cerebral disturbances occurred, hemiplegia was the condition noted. In thirty-four autopsies upon patients who perished as a result of the operation, and in which the brain was examined, the points of interest in connection with this organ were as follows²:

Brain, softened in	-	-	-	-	-	-	-	16
Brain, inflamed	-	-	-	-	-	-	-	8
Brain, anaemia of	-	-	-	-	-	-	-	1
Brain, extravasation of blood	-	-	-	-	-	-	-	1
Brain, abscess of	-	-	-	-	-	-	-	7
Brain, abscess and softening	-	-	-	-	-	-	-	1
Total	-	-	-	-	-	-	-	34

Two hundred cases of death following ligature of the common carotid were studied with reference to interference with the functions of the brain, with the result of showing that twenty-seven per cent of these died from this cause.³ These facts are very suggestive and invite the surgeon's attention before resorting to this measure. In cases of neuralgia of peripheral origin, ligature of the external carotid might be first tried, for the reason that by this means the nutrition of the parts supplied by this vessel, particularly through its internal maxillary branch, could be modified. These parts are likewise identical with the general distribution of the second or superior maxillary division of the fifth nerve, this being more frequently the seat of intractable neuralgia than either of the other divisions. Ligature of the external carotid, if successful, would save the patients the risk of the development of brain symptoms; a diminished danger to life would likewise result from such a course, for it has been shown that the mortality following ligature of this vessel for all causes is only $4\frac{1}{2}$ per cent, as compared to 41 per cent in cases of ligature of the common

¹Wyeth, *Op. cit.*²Wyeth, *Op. cit.*³Wyeth, p. 118.

carotid generally.¹ This mortality of $4\frac{1}{2}$ per cent, in these days of antiseptic surgical practice, and applied to cases such as those under study, in which no disease of the vessel or its branches is present, would probably be still further lessened. Of three cases in which Roser tied the external carotid for facial neuralgia², one is reported as having been cured by the operation. With the slight risk involved in this latter operation, compared to ligature of the common carotid, and with the latter operation still in reserve in case of failure, in properly selected cases the less formidable procedure should certainly be executed first.

CONCLUSIONS.

In estimating the degree of success in these operations the facilities offered for a repetition of the same, in cases in which the pain returns, is a question worthy of serious consideration. For instance, in cases in which the operation of nerve-stretching has been performed for neuralgia of central origin, the destructive changes which the nerve undergoes, and upon which, conjoined with the counter-irritant effect of the traumatism itself, the improvement depends, occupy, according to the statement made by Hahn, a period of about eight months. In these cases of central origin it becomes a very serious question as to whether it were better to exsect the nerve, and thus cut off all means of giving relief in the future by destroying the only channel through which any effect can be produced upon the diseased central organ, or, on the other hand, by the very simple method mentioned, nerve-stretching, produce the changes which experience seems to indicate have a very decided tendency to bring about relief, temporarily at least, from the almost insupportable pain.

When the disease is of undoubted peripheral origin, this question need not arise. Here, the relief, theoretically speaking, should be decided and lasting following a neurectomy, and no choice will be left the surgeon, if he desires to give his patient the benefit of the very best means of obtaining permanent relief. But the differential diagnosis is not always easily

¹Wyeth, p. 134.

²Madelung, *Archiv. f. klinisch. Chirurg. Bd. 17.*

made, nor will the limits of this article permit a review of what knowledge the profession is in possession of that would assist in clearing up certain cases involved in what seems to be an almost impenetrable obscurity. Nor will preliminary operations of neurotomy or nerve-stretching serve to clear up the diagnosis, for the relief obtained, either in its completeness or duration, bears no relation to the gravity of the disease in the central organ if the disease be of central origin. No estimate can be placed upon the value of either procedure as a curative measure until sufficient time has elapsed to cover at least the average time for the processes of degeneration and regeneration to take place. As before stated, cases in which immediate union of a divided nerve takes place must be rare, and instance in which the pain recurs almost immediately are due to an anastomosis (using this expression in a restricted sense) of neighboring nerve filaments. Operative measures, it will be, therefore, at once seen, can be of but slight service in assisting to clear up the diagnosis between neuralgias of central and those of peripheral origin. The pain may recur at once from assumption of function by other nerves, in either variety of the disease: the process of degeneration, following an interference with the integrity of a nerve trunk may, for several months, hold the pain in abeyance: upon the completion of the regenerative process this may return, in either one or the other case.

Owing to the obscurity, therefore, in which the morbid process underlying many of these cases is involved, it will often be found difficult to decide upon the precise operative procedure indicated. The following conclusions, however, may be advanced as the result of the experience of surgeons up to the present day:

1. Neuralgias of the fifth cranial nerve, of peripheral origin, which have resisted methods of treatment other than operative, may be expected to yield to the operation of neurectomy of the trunk or trunks whose branches are distributed to the painful area. In this class of cases the neurectomy should be carried, if possible, to the point at which the nerve makes its exit from the cranium.

2. Cases of central origin should be first submitted to a

limited neurectomy, conjoined with nerve-stretching, in the hope that the process of degeneration thus set up, together with the rest gained by interrupting the centripetally conducted stimuli may favorably influence the diseased central organ. In case of relapse this may be repeated, providing the period of rest thereby gained corresponds to the length of time which Waller's investigations show to be usually occupied by the process of degeneration and regeneration. If no relief is gained, a similar operation should be performed upon all of the divisions of the fifth nerve. This failing, a complete neurectomy of each division accessible should be done; and finally, ligature of the common carotid may be tried as a last resort.

3. In cases of doubtful origin, a complete neurectomy followed, in cases which relapse by ligature of the external and common carotid, in turn, hold out the best prospect of cure.

4. A complete neurectomy of the second division of the fifth necessarily involves the extirpation or destruction of the spheno-palatine ganglion; and to this fact, rather than to any intrinsic tendency of the ganglion itself to keep up the irritation causing the neuralgia, is to be attributed, in all probability, any increasing immunity from relapse claimed to have been obtained in those cases in which Carnochan's operation has been performed.

5. No patient should be denied, other things being equal, the chance which any one, or all these operations in turn may give him of escaping, even for a short time the intolerable suffering incident to an intractable or otherwise irremediable facial neuralgia.

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EDITORIAL ARTICLES.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL SCIENCE IN ITS SURGICAL RELATIONS.

(Continued from Page 226.)

C. SEPSIS.

Septic diseases were among the first to awaken interest in the part played by micro-organisms in disease, and it is, no doubt, due to this fact, that more has been written on subjects relating to septicæmia than on any other subject of bacterial interest in surgery. During the years 1872 to 1874 alone, more than forty original researches on sepsis and pyæmia were published, and some of them by men like Billroth and Virchow. And yet at the present time the subject is by no means fully elucidated, and it is not even possible to give a general definition of the term septicæmia, which could correctly represent all the different conceptions of its nature current at the present time.

Generally speaking, the term septicæmia has of late years been used to designate such febrile disorders accompanying a more or less inflamed (but not necessarily putrid) condition of wounds, in which no metastatic suppurations occurred, and in which, indeed, the autopsy furnished only negative results to the naked eye. The term pyæmia, on the other hand, was applied whenever metastatic abscesses or suppurative processes occurred independently in different parts of the body, whether a wound was present or not. Whether rigors occurred, as in true progressive (thrombo-phlebitic) pyæmia, or not, as in simple metastatic or chronic pyæmia, was only a question of secondary importance to the pathologist. But the general infection occurring in some cases of osteomyelitis was nevertheless spoken of as septicæmia, and metastases were not infrequently spoken of in connection with septicæmia.

Some writers, in fact, claimed the difference between septicæmia and pyæmia to be only a quantitative one, consisting, on the one side, in a gradual, on the other, in a sudden and copious introduction of infective agents into the system, while others maintained that pyæmia was a specific disease *sui generis*, as much so as acute articular rheumatism, and that it was in no wise related to sepsis, where the infectious matter showed no specific tendencies. Again, some authors identified septic and putrid processes, while others distinguished between them.

One point of analogy between the two diseases, however, lies in the fact that micro-organisms have been found present in both. Rindfleisch, as long ago as 1866, found micro-organisms in myocarditic abscesses, and von Recklinghausen, Waldeyer (1871), Klebs and Hüter were the pioneers of our knowledge of septic diseases; the first mentioned first describing the bacteria found in abscesses, while the appearance of Klebs' treatise¹ marked a new era in the bacteriology of septic diseases. In this work the writer identified septicæmia and pyæmia, qualitatively speaking, although he believed putrid and septic infectious processes to be the same.

By this time septicæmia had been also experimentally produced in animals, first by Magendie, whose work was not published, however, and soon after, in 1872, by Cozé and Feltz² and by Davaine³, whose names are best known in this connection.

These authors were able to produce the disease by injecting putrefying substances into the circulation, and could not only demonstrate the presence of bacteria in the blood of the animals, but could inoculate any number of others from each inoculated individual. Examination of the blood of the animals after death constantly revealed numberless bacteria in each drop of blood.

Soon, however, v. Bergmann⁴ was able, by purely chemical processes, to produce out of putrefying blood, a crystallizing substance, "sepsin,"

¹ Beiträge zur pathol. Anatomie der Schusswunden. Leipzig. 1872.

² Recherches expérimentales sur la présence des infusoires . . . dans les maladies infectieuses. Strassbourg. 1866.

³ Bulletin de l'Académie de méd. 2 sér. 1872.

⁴ Das putride Gift, etc. Dorpat. 1866. *Deutsch. Zeitschr. f. Chir.*, I., 373. 1872. *Med. Centralblatt.* 1868. 397.

perfectly free from any micro-organisms, which, when injected into the circulation of animals, caused death with septicæmic symptoms; and, later on, Hiller¹ was able to produce similar affections with ferments, and E. v. Bergmann and Angerer², by injecting pepsin and pancreatin into the blood could occasion all the symptoms characteristic of septicæmic poisoning, such as, in man, is marked by fever, headache, pains in the back and limbs, general weakness, comatose condition, disturbed sleep, dry coated tongue, loss of appetite, impaired digestion, thirst, gastric disturbance, icterus, failing of the heart's action, tumor of the spleen and lymphatic glands.

The most diverse theories were furthermore put forward to explain the action of the bacteria found in septic diseases. While some authors maintained that the bacteria were themselves the essential cause of all disturbance, others believed that the micro-organisms *per se* were harmless, but that they produced some alkaloid virus (ptomaine) which was the sole cause of disease, and others considered them capable of some destructive action upon the blood, thus causing disintegration of the blood-elements and occasioning disease by analogy of ferment-poisoning.

In fact, so great did the general confusion of opinion become, that when, even in the year 1881, E. Semmer, of Dorpat³, undertook to review the state of knowledge of septic infections at that time, he could do so only by classifying the authors under different headings. He divided them all into two large groups, (1) those who experimented with putrid matter on the healthy animal body, without any regard to micro-organisms, which group comprises twenty-nine names, among them Virchow, Billroth, Bergmann, Schmiedeberg and Schmidt; and (2) those who paid special attention to the presence of micro-organisms. The latter group is much the larger, and includes four subdivisions, without counting those authors like Cagniard, Latour, Schwann, Helmholtz, Schulze, Schröder, Dusch, Pasteur, Hallier, who had previously called attention to the fact that putrefaction was due to micro-organisms.

¹ *Centrabl. f. Chir.* 1876. Die Lehre von der Fäulniss. Berlin. 1879.

² Das Verhältniss der Fermentintoxication zur Septicæmie. *Festschrift*. Separatdruck. Leipzig. 1882.

³ *Virchow's Archiv.* Vol. 83, 99. Jan. 1881.

The first subdivision (a) consists of authors who attached no importance to the presence of micro-organisms: Panum and Bergmann. He then (b) enumerates those who deny their influence, Panum, Ravitzsch, Billroth, Hiller, Küssner, Wolff, Eberth, Orth, Tillmans, Dougall, Satterthwaite, Curtis, Anders. (c) The followers of theories ascribing to bacteria etiological importance in the causation of disease are Cozé, Feltz, Greveler, Hüter, Birch-Hirschfeld, Puky, Brehm, Klebs, Tiegel, Kehrer, Sanderson, Landau, Schüller, Bergmann. Another (d) group consists of authors who experimented by inoculating with the blood of animals first rendered diseased. Here again we have two factions, on the one side those opposed to theories investing bacteria with etiological importance, Clementi, Thin, Colin, Dreyer, Laborde, Hiller, Ravitsch, Bouley. On the other side those advocating these theories, Cozé, Feltz, Semmer, Davaine; endorsed by Sanderson, Klein, Vulpian, Leblanc, Colin, Stricker, Clementi, Dreyer, Koch, Gutmann. To this latter group belong Pasteur, Joubert, Chamberlain, who differentiate between putrid and septicæmic infections, and also Chomakow, who believes the septic poison to be affixed to the micrococci.

Meanwhile some of the subtler questions in regard to the conduct of the micro-organisms were being solved by incessant experiments.

Koch, in his classic work on the infectious diseases of wounds,¹ had demonstrated two distinct varieties of septicæmia, one in mice, the other in rabbits (improving on Pasteur's former demonstrations by means of his new methods of staining, etc.). In fifty-four mice he found bacilli $1\ \mu$ in length and $0.1\ \mu$ in breadth, which developed inside of the white blood-corpuscles and were set free when these became destroyed, and could then be seen in the capillaries, though they were not to be found in the lymph ducts and serous cavities. In rabbits he found large oval micrococci floating in the capillaries. From these experiments he first deduced the theorem of the stability of species of the pathogenic organisms.

But the results of the authors mentioned above, Davaine, Cozé and Feltz, taken together with the theories of Naegeli and Wernich, who believed that all micro-organisms could vary their character by a sort

¹ Wundinfektionskrankheiten. Leipzig. 1878.

of evolutionary process and adapt themselves to the media in which they had to live—tended to show that the virulence of the bacteria was progressive, in such a manner that when inoculation was performed from one animal to another in successive so-called generations, one drop of blood of a later generation was much more poisonous in its effects than the same quantity taken from an earlier generation. Thus Davaine could cause rapid septicæmic death in a rabbit by injecting a single drop of a mixture prepared by adding to a quantity of blood of a rabbit, which had died inoculated in the twenty-fourth generation, *one trillion times* its quantity of pure water.

Although these results are not compatible with Koch's tenets regarding the permanence of species, yet so many various experimentators had arrived at similar results with Davaine, that Birch-Hirschfeld, reviewing the matter in *Schmidt's Jahrbücher der gesammten Medicin*, in 1875, had concluded from the evidence then existing that there could be no doubt as to the correctness of the theory of progressive virulence in septicæmia.

In order to throw some light on these conflicting statements Gaffky, of the Prussian army, assisting in Koch's laboratory, undertook the task of investigating Davaine's septicæmia¹. He procured the infection by using water from a stagnant river, and, by continually controlling his experiments with the microscope, using Koch's methods, and working only with pure cultures, he was able to prove beyond a doubt that the theories of progressive virulence of bacteria were untenable. He was enabled, by using pure cultures for inoculation, to attain the highest possible degree of virulence already in the second generation; this result was achieved as soon as the blood itself represented a pure culture of the microbe. The tenet was therefore established, that pathogenic bacteria are specific beings, which can only originate from and bring forth their own peculiar species, gifted, as such, with unchangeable attributes.

Purely putrid infection, on the other hand, in which a chemical substance causes poisoning, cannot, it was shown, be imparted from one animal to another by inoculation of minute quantities of blood.

¹ Experimentell erzeugte Septicæmie, etc. Mittheil. a. d. Kaiserl. Gesundheitsamte. Vol. I. 80.

Although a new epoch was introduced into bacteriology by the establishment of Koch's school, one of the features of which is represented by Gaffky's paper, other publications with different aims still continued, for a time, to appear. Rosenberger,¹ who, after producing Davaine's and Pasteur's septicæmia (the latter the so-called malignant oedema of Koch) sterilized the blood containing the micro-organisms, but was nevertheless able to produce the characteristic disease, together with the characteristic micro-organisms by injecting this sterilized fluid into healthy animals, was led to believe that the poison existing in septicæmic blood had the property of converting harmless bacteria, which he consequently supposed to exist in healthy tissues, into specific pathogenic ones.

Zweifel² also concluded from his experiments that bacteria were harmless, unless they were deprived of oxygen, in which case they produced a poison deleterious to the system. His experiments had tended to prove that oxygenized blood would not become putrid, although micrococci were present. but that deoxygenized blood readily turned putrid; highly oxygenized blood, moreover, when injected into the abdominal cavity of animals, did not cause septic peritonitis, whereas deoxygenized blood always did.

The influence of oxygen on the development of certain micro-organisms was first pointed out by Pasteur.

Rosbach found that papayotin, when injected into the circulation of animals, soon caused numerous micro-organisms to appear in the blood, which observation he explained by the supposition that micro-organisms were prevented in some way from developing in healthy blood, until aided by the action of the ferment.

Meanwhile other investigators continued the researches in other directions. Ziemacki³ repeated the experiments of von Recklinghausen, etc., and searched the organs of eighteen cases of phlegmons, abscesses, puerperal fever, etc., for micrococci. He found them situated in the capillaries, where they could be developed into colonies by keep-

¹ Ueber das wesen des septischen Giftes. Leipzig. F. C. W. Vogel. 1882.

² Untersuchung über die Entstehung des sept. Gifts, etc. *Zeitschr. für Physiol. Chemis.* Vol. VI. Hft. 4 and 5.

³ Beitrag zur Kenntniss der Micrococcencolonien in den Blutgefässen bei sept. Erkrankungen. *Prager Zeitschr. f. Heilkunde.* Vol. 4. 89.

ing the organs in a moist atmosphere at a temperature of 35° C. for twenty-four hours. He could not produce similar colonies in cadavers which had not been previously subjected to septic infection.

Brieger¹, Maas² and others continued the experiments of chemical extraction of ptomaines, following the researches of Thiersch, v. Bergmann, Panum, Samuel, Hiller, so that the literature on this subject soon became very extensive, and the fact of putrid intoxication by ptomaines became well established.

Thus on the one side, sufficient evidence was acquired that chemical substances can produce septic symptoms; but, on the other hand, the evidence is continually growing with the extension of Koch's school, that bacteria are present in septic diseases, and that no bacteria are present in healthy tissues. But the question as to what part the bacteria actually play in the disease, whether their effect is due to some specific action or qualities, either mechanical or chemical, of their own, or to some poisonous substance, which they produce, or to the destruction of some substance which they consume, still remains open. The conclusion that septicæmia in man is due to the presence of micrococci in the blood, is, as we have seen, to a great extent drawn from analogy with the experimental septicæmia in animals. Now, it might be objected that we were not justified in admitting the conclusion. But Garré³ has recently furnished some experiments quite analogous to those of Gaffky. Inoculating his own person *lege artis* and with antiseptic precautions with pure cultures of the organisms found by the most approved authorities to be most frequently present in septic diseases (*staph. pyog. aur.*), he was able to produce not only local symptoms of suppuration, but general symptoms resembling those of septicæmia, fever, sleeplessness, etc., although, as the author admits, the infection was not as serious in all cases as might be scientifically desirable.

These experiments, however slight they may appear in value, are of

¹ Giftige Producte der Fäul.-Bakt. *Berl. Klin. Woch. Schrift.* 1884. No. 14. *Zeitschrift f. physiol. Chem.* 1884. VIII. Hft. 4. *Berichte d. deutsch. Chem. Ges.* 1884. XVII. 215.

² Ueber Fäulniss-Alcaloide. *Fortschritte der Med.* 1883. No. 11, 473, with review; 1884. No. 22. 729 *Arch. f. klin. Chir.* Vol. 29. Hft. 3. 1883.

³ *Fortschritte der Medicin.* Vol. 3, 165. No. 6. March 15.

much greater importance than the occasional infections of wounds occurring in daily surgical practice, with instruments, etc., because they were performed with pure cultures and with suitable precautions.

But even if it be conceded that septicæmia can be transmitted by inoculation from man to man, it cannot be denied that the analogy between the experimental septicæmia of Davaine in animals and the disease usually designated by the term septicæmia in man is incomplete. In the first place, the micro-organisms procurable by culture-experiments from the blood of both are not the same. This fact, however, is not surprising, since we know that septic diseases in mice and in rabbits also differ in the species of germs present, and only necessitates a broader definition of the term.

In the second place, however, the number of micro-organisms present in septicæmic blood of man is so small that it is frequently impossible to obtain pure cultures by inoculation of soils with such blood, whereas, on the other hand, the number of bacteria to be seen in the blood of rabbits rendered septicæmic by experiment is so great that it appears sufficient to cause death simply by mechanical means.

It therefore seems natural to suppose that the micro-organisms of septicæmia are capable of producing some poisonous substance which kills the patient before the micro-organisms have sufficient time to multiply to the extent that the septic micro-organisms do in rabbits or in mice, or that other species of micro-organisms, as those of anthrax, do in man.

Prof. Neelsen, of Rostock, pointed out this difference in a paper read before the thirteenth Congress of German surgeons at Berlin¹. He suggested the name of *acute mycosis of the blood* for those diseases where the blood-vessels appear crowded with micro-cocci before death. He believes these micro-organisms only prove fatal in great numbers because the virus is in some way fixed to them, and can only become potent if they greatly multiply. The other line of diseases, on the contrary, where, as in septicæmia, death occurs when only comparatively few micro-organisms are to be found before death, he would have called *toxic mycoses of the blood*, and believes the poison gener-

¹See report. Berlin, April, 1884. "Wie lassen sich die klin. Begriffe Septicæmie," etc.

ated by the micro-organisms to be soluble in the blood and fluids of the body, and thus capable of acting independently of the microbes themselves and at a greater distance.

Neelsen, however, believes septicæmia in man to be far more complex in its nature than the last described disease, and believes that it is a combination of a putrid infection by ptomaines¹, with some such toxic mycosis of the blood as above described, necessitating the circulation of some micro-organisms capable of producing poison in the blood. In fact, he distinguishes three separate elements in septicæmia, the presence of some pyogenic or pus-forming organism being essential to the combination, as well as the other two component elements. These pyogenic germs would, according to his view, produce suppuration, either at the seat of the wound or at some more distant point, whither they might have been transported by the lymph or blood-current. Such cases should then be correctly termed septicæmia with lymphatic or phlebotic metastases, respectively.

Neelsen, it should here be remarked, considers pyæmia a specific disease of an entirely different nature, occasioned by the action of micro-organisms gifted with the power of resisting the effects of the blood-current (so destructive to many kinds of organisms) and with the peculiar ability of leaving the blood-course and of establishing themselves at other points in the tissues, here to produce suppuration. The latter virtue distinguishes them from the organisms of toxic mycoses, which never leave the blood-vessels, though they are likewise capable of resisting the deleterious effects of the blood-current.

In support of his theory, the author argues that neither those micro-organisms which produce acute mycoses of the blood, nor those which produce toxic mycoses show any signs of putrefactive action when cultivated alone, though the latter assertion still requires further proof.

Again, it is not the germs of putrefaction themselves which produce symptoms of putrid intoxication, since these micro-organisms are very soon killed, when once introduced into the blood-current, but only their chemical poison, when absorbed. And even when putrid poisons (ptomaines) are absorbed, there must be several different kinds simul-

¹ Probably by absorption from the wound.

taneously absorbed in order to produce the complete set of symptoms found in septicæmia, since the injection of any one of the known ptomaines alone, even of Bergmann's sepsin, is not sufficient to produce the entire complex. It is essential to the clinical picture of true intoxication with putrid virus, that none of the five symptoms, fever, vomiting, profuse diarrhoea, somnolence, increasing failure of the heart's action, be absent, and this can only be the case when a combination of several different kinds of putrid virus is absorbed. As regards this latter question, it may be remembered that Prof. Blumberg, of Kasan—and this brings us to the latest publications on this general subject—concluded from his numerous experiments on animals¹ that the symptoms of inoculation with putrescent material very considerably vary, that in fact extreme asthenia, heightened temperature, acceleration of the pulse and respiration-rate, are the only constant symptoms found.

Blumberg also confirmed the statement that the blood of animals dying from putrid intoxication contained no micro-organisms, and Fränkel,² who had found but few micrococci in the blood of septicæmic patients and observed that they greatly increased shortly after death, but after lapse of some further time, altogether disappeared, thus also confirmed a fact previously known, that putrefaction destroyed septic germs.

The general impression produced upon the discriminating observer by the present aspect of the whole subject under consideration, then, is that *septicæmia is probably due to the action of bacteria in the blood producing some poison analogous to the known ptomaines*—which is a view expressed by Koch.³

The next step towards a more complete knowledge of the disease would call for a more exact bacteriological description of the kinds of micro-organisms found in the blood, and an extensive series of chemical experiments analyzing the special ptomaines produced by each separate species of these microbes, as heretofore ptomaines have generally been extracted only from putrescent material containing all va-

¹ *Virchow's Archives*. June 8, 1885. Vol. 100. Hft. 3.

² Ueber Micro-org. der chir. Infections Krankheiten. *Wiener Med. Wochschrift*. 1885. XXXV. 108, 141, 173.

³ Wundinfections Krankheiten.

rieties of micro-organisms at once. Physiological experiments testing their action upon animals will then help to complete this programme.

The isolation and special study of the septic bacteria is going on at the present time and has become fairly advanced.

Rosenbach, of Goettingen, in his book on the micro-organisms found in infectious diseases of wounds¹ published a description of the bacteria found in septic diseases.

In three cases of septicæmia which he examined, he found the *staphylococcus pyogenes aureus* present each time in suppurations in the tissues; in two of the cases he found an organism of putrefactive quality present in the secretion of the wound (*bacillus saprogenes* No. 3). In two of the cases no cultures could be procured from the blood. In two cases of gangrene, with general septicæmic symptoms, *streptococcus pyogenes* was found throughout.

Intoxication with putrid matter he believes due to the presence of three distinct species of bacilli, which he terms *bacillus saprogenes* No. 1, 2, 3, respectively. No. 1 he cultivated from putrescent blood, and this he believes to be comparatively harmless. No. 2, facetiously termed "*Bacillus Scheidemanni*," because it was found to be the cause of the disagreeable odor of the foot-perspiration of a patient of that name, he characterizes as "invasive," pus-forming, but probably not toxic. No. 3, having the same properties, was found in a complicated fracture which had become putrid. The patient subsequently died and *staph. pyo. aur.* was found in the metastases.

Rosenbach, however, it must be borne in mind, takes a somewhat exceptional view of sepsis, and appears to combine the idea of a foetid condition of the wounds and offensive discharge with the term sepsis, making no sufficiently clear distinction between septicæmia and sapræmia. He moreover hints that perhaps the true micro-organism of septicæmia is not yet found.

Passet,² who did not attempt any culture-experiments with blood of septicæmic patients, cultivated eight kinds of micro-organisms from various unopened phlegmons and abscesses of a septic (not putrid)

¹ Wiesbaden. 1884.

² Untersuchungen über die Aetiologie der eitrigen Phlegmone des Menschen. Berlin. 1885. Fischer's Verl.

ture, the most frequent forms of which were identical with those described by Rosenbach. With these he succeeded in producing more or less marked results upon animals, many of whom died with symptoms resembling septicæmia.

The characteristics of the micro-organisms described by Passet (staphylococcus pyogenes, albus, aureus and citreus; streptococcus; pseudo-pneumo-coccus; staphylococcus cereus albus and flavus; Bacillus pyogenes fœtidus), have recently been given in this journal. (Vide ANNALS OF SURGERY, Jan., 1886, p. 71 et seq.).

Physiologically considered, all the species have an extensive existence. The streptococci live about three months; the others, however, are easily inoculated after a lapse of six months, the staphylococci even after twelve months. Dried up specimens were inoculable after ten days. Cold (+4° C.) prevents their growth, but does not destroy them. Temperature of boiling water destroys them. The gelatin was only liquefied by the staphylococci, most likely, in the opinion of the author, by means of the formation of peptone.¹

The principal forms of these micro-organisms, the staph. aur. and alb., were found by Rosenbach and Garré in acute osteomyelitis, and by the latter coursing in the blood—a fact interesting in so far as it throws a certain light upon the clinical observation that septicæmia frequently occurs in acute osteomyelitic disease.

Garré also confirmed Passet's results as regards septic affections of the tissues (unopened abscesses, furunculi, phlegmons, whitlows, etc.), examining seventy-two cases in all, and forty-eight of these with Koch's culture-methods. In forty-five of the latter and sixty-eight of the former he found staph. aur. Strept. pyog. he found only in four causes of phlegmoné.

We possess also a very interesting paper on the results of examinations made of human milk, by Escherich, of Vienna², which bears upon the present subject.

After assuring himself by the examination with suitable methods of twenty-five healthy cases that normal milk contained no micro-organ-

¹ If this latter were an established fact it would give rise to interesting theories regarding septicæmia, especially when taken together with the physiological fact that peptone prevents fibrin-coagulation in the blood.

² *Fortschritte der Medicin.* Vol. 3, 231. No. 8. April. 1885.

isms, he investigated the milk of such patients whose bodily temperature was elevated by reason of disturbances in the puerperal process or lactation, who, in fact, presented more or less severe septic disorders; and here he regularly found micrococci present in the milk, principally staphylococci, aureus and albus.

In the cases of such *puerperæ* who had fever from other causes, such as pulmonary phthisis, otitis media, etc., no micro-organisms were found in the milk.

Escherich believes that the micro-organisms are introduced into the milk through the blood, which they enter, in puerperal septicæmia, through wounds of the genital tract.

From these strictly bacteriological investigations it would seem that the real cause of septicæmic disorders were the staphylococci, and that the other species were more of local importance. The bacilli, on the other hand, appear more closely connected with sapræmia and putrid processes.

W. W. VAN ARSDALE.

THE IMPORTANCE OF EXAMINING THE RECTUM DIGITALLY IN CASES OF INTESTINAL OBSTRUCTION.

The importance of always examining the rectum digitally in cases of intestinal obstruction is well exemplified in a case reported by M. Trélat in the *Gazette des Hôpitaux*, for October 27, 1885.

In his report M. Trélat makes some criticisms which can hardly be pleasant reading for the colleague under whose care the patient was placed.

Briefly, the facts occurred as follows:

On the 13th of September a man of 51 years of age was admitted into the Charité with a swollen tympanitic abdomen, neither wind nor fæces having passed for five days.

The previous history was that eight years ago he had an *attack of vomiting, diarrhæa, marked emaciation and loss of strength*. Then followed eight years of good health till four months ago, when a similar attack seized him and caused him to enter the Charité under M. Bernutz for a week, when he improved sufficiently to be able to re-

sume work, only occasionally suffering from acute abdominal pains and a continuous diarrhoea. Suddenly, on the 8th of September, the diarrhoea ceased, and was replaced by a most obstinate constipation; on the 13th he was admitted into the Charité in the condition already described.

"Now," says M. Trélat, "if you had been given all the information which I have just been reading to you, no stools, no wind per anum for several days, would not your first step have been to examine all the concerned regions and orifices, and to have passed your finger into the rectum? As a matter of fact, no finger was introduced into the patient's rectum; and it was owing to this omission that the patient died so prematurely. Do you know what was done to this patient? Trivial remedies were applied, an enema was given, ice placed on the belly, and all this was done without an examination of the rectum. Thirty-six hours later the patient died."

"The post-mortem report says: 'A hard faecal mass was found lodged in the colon and cæcum. The intestine, perforated at two points, had allowed some particles of faeces to escape into the peritoneal cavity. We were all astonished to find some 10 centimetres from the anus a superb epithelioma, which rendered the gut absolutely impervious.'

"But at this height a rectal examination would have discovered the tumor, and common sense should have suggested its practice all the more because there was nothing to indicate internal hernia or internal strangulation.

"I certainly incriminate nobody. Probably the *chef de la clinique* had hardly time to examine the patient, but I have a right to say that the patient's condition was not recognized as it should have been. I certainly incriminate the assertion that the external appearance gave no clew as to the condition. It is an abominable accusation, which even the oldest practitioners have no longer any right to make, that we surgeons only operate on cancerous subjects with well marked cachexia, hopeless subjects, yet this is the spirit which characterized the management of this case.

"This is a most detestable error, and once more I repeat, when you have before you an intestinal obstruction which has lasted a certain

time, and it is quite clear that no hernia exists, nor any other appreciable cause, the first duty is to examine the rectum with the finger. This was not done in the present case, and this omission it was which prevented a true diagnosis being arrived at, in which case lumbar colotomy might have prolonged the patient's life for some months.

"Although this case was not under my care, I was anxious to bring it before you, not with the view of incriminating a colleague, but to warn you against a similar mistake."

On reading this case the first feeling experienced is one of admiration for M. Trélat's pluck in bringing it before his professional brethren. Assuredly a man must feel himself very secure before he arraigns a colleague at the bar of public opinion on a direct charge of neglect, for whatever M. Trélat may disclaim as to incriminating a colleague, the fact stands that he *does* bring a charge of neglect of duty against the medical side of his own hospital.

That there were extenuating circumstances is not to be denied; some symptoms nearly always present in epithelioma of the rectum appear to have been absent, such as blood passed per anum and local pain, whereas other incidents were well calculated to throw an overworked physician off his guard, such as the history—an epithelioma of the rectum does not generally endure eight years, and the fact of total obstruction, which, although it does occur in epithelioma, is not so common in malignant trouble as in other obstructions. Still cases cannot always be expected to run a routine course, and that is just the very reason why such a very obvious method of examination as is afforded by the finger in the rectum ought certainly never to be neglected in such a case as this. Surely all surgeons must heartily indorse every word spoken by M. Trélat on this head.

But the question naturally arises, why should cases of intestinal obstruction be admitted straight off on the medical side of a hospital instead of on the surgical? Surely, in nine cases out of ten, the obstruction is of a kind to be relieved by surgical means; and, in the face of the case just quoted, there can be no doubt that, as regards the question of diagnosis, surgeons are at least as likely as physicians to arrive at a correct conclusion.

The difference between, say, a strangulated inguinal hernia and a

bit of ileum bound down by a band in these days of antiseptic abdominal surgery is comparatively unimportant; time in both cases is everything, and it surely gives the patient a better chance to be placed at once under the care of men of action than to remain for perhaps a couple of days in the medical ward before the case is recognized as one fit for surgical interference.

W. J. ROECKEL (London).

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. Communications from the Surgical Clinic of the University of Tokio, Japan. By Prof. J. SCRIBA. *a.* The first of this series of papers contains a contribution to the knowledge of the *etiology of acute myositis*. The author gives four cases, in all of which multiple inflammatory processes in the striated muscles suddenly appeared, after a slight suppuration, in the form of an abscess or furunculus, had been developed in the skin or mucous membrane, and while the process of reparation was going on. This acute inflammation of the muscular substance proper would, under proper and sufficiently early treatment, pass away again, or else lead to suppuration and finally heal without detriment to the muscle, regeneration having taken place.

The author believes the disease arises from some condition of the blood and is occasioned by the invasion of micro-organisms, in a manner analogous to that of acute osteomyelitis, the product of the inflammation being either serous or purulent in character. He suggests the term "infectious myositis" for the affection. The symptoms consist in a hard swelling, preserving the exact shape of the muscle, which is itself painful to the touch, and the surrounding parts of which show no sign of sensitiveness nor inflammation.

b. Elongation of a muscle by means of pedunculated muscle-flap. In an old case of compound fracture of both bones of the fore-arm which had healed with contracture of the flexors of the fingers and cicatricial involvement of the tendons, the author, after making incision, united several severed tendons, which had remained ununited, but found that the extensor digitor. commun. muscle could not be united to its tendon on account of loss of substance of the latter. So as to elongate the muscle, he therefore divided it in its upper portion trans-

versely half way through, and splitting the muscle longitudinally for some distance down, turned the flap thus formed back and united its (proximal) end to the free end of the tendon. Union took place by first intention, and free motion of the fingers was made possible.

The author is of opinion that such plastic operations could not be done with healthy muscles; but in this case the muscle was hard and shrunken.

c. On peculiarities of the Japanese skull due to race, as affecting surgical methods of operation. In performing the operation of excision of the superior maxilla, the author found the fossa pterygo-palatina too narrow to admit a small straight saw in order to pass it through the foramen speno-palatinum and found it necessary to divide the alveolar process off from the superior maxillary bone. On examination he further found that this anomaly was one of race, the patient being Japanese. He therefore describes the differences of skull-formation between the Caucasian and Mongolian race. He advocates performing the resection of the superior maxillary bone after O. Weber instead of after v. Langenbeck. In the latter case the saw must be introduced into the apertura pyriformis (in operations upon Japanese subjects) in order to sever the alveolar process from the body of the bone.

The operation of *resection of the second branch of the fifth nerve* likewise demands some modification when the patient is Japanese, and, not only for such cases but for Europeans as well, the author recommends the following method:

The first incision is to be made through the skin and tissues including the periosteum down to the bone commencing a little below the external palpebral ligament and extending perpendicularly downwards to the lower margin of the zygomatic process of the superior maxilla. A second incision is then carried from the upper end of the first one to the middle of the zygomatic process of the temporal bone, also severing all the tissues excepting the temporal muscle in the middle portion. After dividing the periosteum, the zygomatic bone is then to be separated from the skull, its union with the superior maxilla being divided with a chain-saw, the zygomatic process of the temporal bone being cut through with a chisel. The whole flap, together with the

loose zygomatic bone, can then be turned downwards, the margins of the inferior orbital fissure chiseled off, and thus access gained to the foramen rotundum. The nerve is then to be drawn out and cut off, and the flaps replaced.

He further advises a modification of *infra-orbital neurectomy* after v. Langenbeck for Japanese subjects. After exposing the point of egress of the nerve (for. infra-orb.) the author inserts a long, narrow blade of a scalpel (instead of a tenotome) close to the lateral part of the inferior orbital margin 2.5, or 3.5 centimetres into the orbita, keeping close to the external wall, and then, lowering the point, divides the parts in the fissure. The nerve can then be extracted through the infra-orbital foramen.

d. Contributions to the etiology and therapy of aneurysms. The author treated seven cases, six of which were cured or improved, and one of which died, which had been treated by Reid's method of compression. He is in favor of operative treatment, generally speaking.

In Japan the disease is frequently caused by *endarteritis syphilitica*, the pathological anatomy of which the author describes in detail. He suggests the following method of treatment:

Indirect compression should be tried in all cases, if necessary with the assistance of narcosis. If a nurse can be had, digital compression after Burke-Esmarch, if not, instrumental compression with a stick or Bulley's apparatus is to be used. Uninterrupted elastic bandaging after Reid is considered very dangerous but very effective, and perhaps more suitable for traumatic aneurisms than for other kinds.

In all cases in which compression fails, Anel-Hunter's ligature at the nearest healthy point to the sac is recommended.

Extirpation of the sac is indicated (1) in rupture of the aneurism; (2) in all arterio-venous aneurysms, if after ligature at a central point the pulsation and bruit continue; (3) in cases where Anel-Hunter's method is not successful, or where there is any recurrence; (4) in aneurisms of small arteries; (5) in arterial angiomata.

Ligature of the efferent vessels after Brasdor-Wardrop is to be performed only when a central point cannot be reached, and all efferent branches are accessible.

For ligatures the author prefers silk which has been boiled for ten

minutes in a 1 per cent solution of corrosive sublimate, and preserved in the same solution until used, and then rubbed with iodoform powder.

The author publishes thirteen pages of tables showing the results of different methods of treating aneurisms, and adds an extensive list of the literature of the subject.—*Deutsch. Zeitschr. f. Chir.* Bd. 22. Hft. 5 and 6. Octob. 1885.

II. Contributions from the Mansfeld Hospital for Miners at Hettstedt. By Dr. HILDEBRANDT. He gives his experiences during the year 1884 in the above named hospital, and publishes the more interesting cases occurring during this time, representing chiefly injuries and accidents to miners.

Sawdust as a Wound-Dressing.—As a former assistant of Volkmann, he had essayed dressing the wounds in the same manner at Hettstedt as he had been accustomed to do at Halle; but being somewhat limited as to means, he found he had to abandon expensive dressings, and, instead, adopted sawdust, and with capital results. He had the sawdust sifted, then steamed in a closed box for several hours, and finally moistened with a two-pro-mille sublimate solution. This he applied to the wound, wrapped in sublimated gauze.

In this manner he treated sixty major surgical operations, including nine compound fractures, and only once disturbance occurred in the course of healing, erysipelas having set in through the patient's opening the dressing.

Four tuberculous and osteomyelitic foci were treated with scraping out and application of Pacquélin's cautery. Skull-fractures all ended fatally excepting one, which was trephined. The indication in this case was not given by a depression, but a few hairs were observed in a fissure. The author expresses himself in favor of trephining, even when no great depression is present, if the fissure appear in the least unclean or liable to become septic.

One laparotomy for removal of gall-stones in the gall-bladder was successful.

Five cases of nerve-stretching with good results are recorded, and one case of ligaturing the external iliac artery and vein at the point of

union with the common iliac did excellently.—*Deutsch. Zeitschr. f. Chir.* Bd. 22. Hft. 5 and 6. October. 1885.

W. W. VAN ARSDALE (New York).

NERVOUS AND VASCULAR SYSTEMS.

I. Nerve-Suture. By Dr. NICAISE (Paris). The case is reported of a young woman, who accidentally severed the median nerve at the wrist by falling through a window. The wound healed in eight days; but, from the time of the injury, there were anæsthesia and paralysis of motion in the parts below supplied by this nerve. Six weeks after the accident she entered the hospital. The scar was tender, and pressure on it caused tingling and numbness in the outer half of the hand.

The cut ends were found to be bulbous, and so markedly degenerated that a considerable ablation of nerve was required in order to reach healthy tissue. The freshened extremities were brought together by fine catgut stitches, passed from the sides of the proximal portion to the lowest level of its cut surface, and by tracks symmetrical with these through the distal portion. The Lister dressing was applied, and the parts immobilized in a plaster splint.

The pain was at first severe, preventing sleep. Sensibility began to appear in the thumb the next day, and improvement continued so rapidly that the patient was discharged on the thirteenth day, able to use considerably the previously crippled hand. Four months afterwards the parts which had been anæsthetized were sensitive to pricks, but not to the touch of a blunt object. There was no pain in the limb; but when the thumb was pricked, not only was the impression felt at the point touched, but a pain was experienced in the shoulder.

Nicaise believes that immediate union of nerve filaments does not occur in man. Degeneration takes place in the parts of a nerve peripheral to its section, though it is held by some pathologists that not all the axis-cylinders are involved in this process. In this case union and partial restoration of sensibility were achieved long after the receipt of the wound, and when degeneration obviously had occurred. Though suture undoubtedly had a salutary effect on the distal parts, it could not by itself have induced regeneration so rapidly. Brown-Se-

quard asserts that the irritation of the central end in the process of suturing increases the functional activity of the anastomotic nerve filaments which supply the uninjured trunks, and are distributed to the paralyzed parts. Though any irritation of the central parts may answer the purpose, the surgeon should select that which is demonstrably the most certain and permanent, namely, suture, which, thanks to the antiseptic method, is free from danger.

Tripier criticises this theory. To his mind neuritis alone explains the phenomena, which he analyses with great skill and force. He agrees, however, that suture should be performed at as early a date as possible after the injury. *Rev. de Chirur.* 1885. No. 7.

F. H. GERRISH (Portland).

HEAD AND NECK.

I. On Operations for the Removal of Adenoid Growths in the Naso-Pharynx. By Dr. J. GOTTSTEIN (Breslau). There are three methods for the operative removal of adenoid growths in the naso-pharynx, apart from those employed for their destruction by caustic means and the galvano-cautery, namely, (1) by the snare, (2) by the forceps, (3) by the curette. Up to the present the removal with the curette, especially that of Lange, seems to have found most favor. The author has constructed an instrument which has, he thinks, some advantages over those in present use. To a handle of wood, 10 ctm. in length, is affixed a shaft of steel, 7 ctm. long, the end of which is pear-shaped and fenestrated, and bent to nearly a right angle to the shaft. There is a slight upward curvature in the shaft close to this pear-shaped end. The latter is 3 ctm. in height and 2.5 ctm. in width at its broader or upper part, its outer surface, i. e., that which comes in contact with the pharyngeal wall, being flat and smooth, whilst the inner upper edge of the window-like opening is sharpened. The manner of operating with the instrument is as follows:

The tongue being depressed, the instrument is passed under the velum, and its end pressed firmly against the pharyngeal wall, at the place where it is desired to operate. By so doing the adenoid growths are squeezed through the fenestrated end of the shaft, when, by a firm traction downwards, they are shaved cleanly off. This procedure

may be repeated several times without withdrawing the instrument, although the author agrees with Simon, that it is better not to attempt too much in one sitting. The instrument is also useful in excising Luschka's tonsils. It differs essentially from the instruments of Lange or Meier, inasmuch as those are simply curettes, whereas that of the author acts on the principle of a tonsillotome or laryngo-guillotine. Tearing of the mucous membrane is avoided by the clean cutting of the sharp edge, the hæmorrhage is usually slight, as is also the reaction. The author uses no chloroform, and rarely has any assistance in operating.—*Berliner klin Wochenschrift*. No. 2. Jan. 11.

II. On Blood-Cysts of the Lateral Regions of the Neck.

By Prof. Dr. GLUCK (Berlin). In a paper read before the Berlin Medical Society on November 18, 1885, the author, after touching somewhat on the etiology of these blood-cysts, described a case operated by himself, in which the results were most favorable. Blood-cysts, he says, are tumors, which contain only fluid blood, communicating directly with some large vein; they may be emptied by pressure and quickly refilled on removal of the latter. It happens sometimes that a cystic ectasia takes place in the centre of a pharyngeal arch, both ends of which have become obliterated. Such seems to have been the origin of the case here reported, although its character was changed to that of a blood-cyst through the communication existing with the common jugular vein, a fact, he says, heretofore unobserved, the contents of such pharyngeal-arch cysts being usually of a serous or mucous character. The sac itself was formed of connective-tissue, having a roughened, wart-like inner-surface. The papillary excrescences on this inner surface consisted, microscopically, of villi, which somewhat resembled, at first sight, those of the intestinal tract, and were covered with cylindrical epithelium, stratified.

The patient, a girl, æt. 16, had first noticed the swelling some ten years previously, and had remarked that its size varied at times and that it appeared to be erectile. The tumor was easily compressible, filled up again quickly on removal of the pressure, and on puncturing, was found to contain pure blood. When Valsalva's experiment was performed, a bluish swelling in the lateral region of the neck was easily observed. The free communication with the common jugular

vein rendered ligature of the latter necessary before removing the cyst, which was successfully accomplished according to Wolff's method. A large hæmorrhage from the jugular was controlled by ligating its central end, which had been dissected free, in case this emergency should arise. Tampons prepared in iodoform-ether were used, and under this treatment the wound healed rapidly. No relapse occurred. A similar case was operated by von Langenbeck in 1880, which has never been published. The sac here was a varicose ectasia of the wall of the vein (common jugular). The author's case is the nineteenth which has been reported, and the sixth in which the operation proved successful. It is an interesting case from many standpoints. The difficulties in operating were great, the operation lasting three hours. The unusual character of the cyst and its communication with the jugular make it interesting, as the latter fact would tend to show that in all probability numerous blood-cysts of the neck are of congenital origin and really pharyngeal-arch cysts. The case may also be regarded as of still further importance, inasmuch as we find that no coagulation of blood, flowing over a surface rough with wart-like excrescences, etc., took place; but that it was, on the contrary, in a perfectly fluid state, as was clearly demonstrated by the violent squirting after incision of the sac. This is contrary to the generally accepted theory of Brücke, according to which all elements excepting the normal endothelium of the interna, act as foreign bodies in the blood-channels, causing coagulation of blood in their neighborhood.

Operations on blood-cysts are, technically speaking, among the most difficult in surgery. The danger, however, with proper observance of antiseptic measures, is not great. Extirpation of such cysts is indicated in cases where their size is large, causing inconvenience by pressing on the nerves, trachea, etc. The author furthermore believes that their extirpation is necessary from a prophylactic standpoint, inasmuch as from the proliferating epithelium of these pharyngeal-arch cysts, a carcinoma may take its origin. Volkmann, rightly judging of the genesis of the latter, called them bronchogenous carcinoma.—*Deutsche Med. Wochenschrift*, No. 5. Feb. 4, 1886.

C. J. COLLES (New York).

III. Congenital Cyst of the Neck. By M. MONOD (Paris).

M. Monod had treated by injection with liquid chloride of zinc a cyst of the neck, with viscous contents, in a little girl. Cure was accomplished at the end of a month, after sloughing of a considerable extent of skin. But in six months, a relapse ensuing, M. Dubar excised it by the bistoury, with some difficulty, owing to cicatricial adhesions. Another relapse in some months was treated by excision, and this time cure was established at the end of a year. This course is common in cysts of the neck, and the main interest of the case is in the histological details given by M. Dubar. The tumor removed after the first recurrence was formed by a sac sending into the depths of the neck a prolongation, closed at the bottom by a collection of epithelial cells, so that the caustic injection had been forcibly stopped—an arrangement showing the inefficiency of this mode of treatment. The small tumor removed at the second operation was a cyst lined by ciliated columnar epithelium, and having epithelial shoots ready to invade the neighboring tissues. M. Dubar hence concludes that the tendency to recurrence of cysts of the neck is due to the structure of their walls and their properties of pushing out epithelial prolongations. In consequence, their removal should be widely made beyond the limits of the tumor.

M. Monod restricted this last explanation as applicable only to cysts already operated on. For virgin cysts, *exact* and complete removal would be sufficient.—*Société de Chirurgie de Paris*. 22 July, 1885.

CHEST AND ABDOMEN.

I. Cases of Explorative Laparotomy. By M. LUCAS-CHAMPIONNIÈRE (Paris). I. *Tumor in the right side; explorative laparotomy; pedunculated hydatid cyst recognized and removed.* The patient had a tumor of which the diagnosis was obscure, but by elimination a tumor of the kidney was supposed. Laparotomy was performed on July 10, as the most certain and expert way to verify the diagnosis. The kidney of the opposite side, the integrity of which should always be determined before removing the unhealthy kidney, was found atrophied, while the right one, found with some difficulty,

was hidden behind the liver. The tumor, everywhere adherent, was fixed by a pedicle to the anterior border of the liver; it was removed without many difficulties, but a portion of the wall, too adherent, was left attached to a piece of intestine. It was a hydatid cyst of the liver, pedunculated. Several similar cases have been noticed recently. The patient, operated on twelve days ago, is going on well.

II. *Tumor of the right side; exploratory laparotomy; pyelo-nephritis recognized; nephrectomy twenty days after.* A woman admitted to the hospital with a large tumor in the right side, very painful and of difficult diagnosis; a nephritis or suppurated perinephritis suspected. A puncture gave issue to a litre of pus, but did not determine more precisely the diagnosis, and on May 21 an exploratory laparotomy was decided on. Pyelo-nephritis was recognized, and the abdomen re-closed; on the 13th of June the removal of the kidney was effected, through a slightly oblique incision behind the external border of the right rectus, the peritoneum being easily separated as far as the kidney; the size of which would have prevented removal by the lumbar method without costal section; the ureter and thickened fragments of the capsule were also removed. A slight tear in the peritoneum, caused during its separation, was sutured. Healing was complete without suppuration the twenty-first day; the patient passing 1,500 grammes of urine per day.—*Société de Chirurgie de Paris.* July 22, Aug. 19, 1885.

P. K. ABRAHAM (London).

EXTREMITIES.

I. *An Operation to Correct Deformity Resulting from Extensive Loss of Skin in the Arm.* By Mr. JOSEPH BELL (Edinburgh). Patient came to hospital requesting amputation for results of cicatricial contraction after phlegmonous erysipelas of arm. Mr. Bell determined to shorten the limb, instead. He removed the lower three inches of the humerus including the condyles. The result was a useful arm, with all the elbow movements, and now quite healed.—*Edinburgh Medical Journal.* Sept. 1885.

C. B. KEETLEY (London).

GENITO-URINARY ORGANS.

I. Two Rare Varieties of Rupture of the Bladder. By Dr. A. POUSSON. The question is raised of the possibility of an absolutely spontaneous rupture of the bladder, that is, rupture without pathological alteration in its walls and without traumatism. The author adduces testimony to show that the tear may result from either the contraction of the abdominal walls on a full bladder, or the contractions of the walls of the bladder itself.

In support of the first explanation of the accident, cases are cited in which men lifting great weights felt a sudden pain in the hypogastrium, and could not urinate afterwards. Death speedily ensued, and rupture of the bladder was found at the necropsy. The violent straining with the abdominal muscles on a full bladder was the cause of the injury. The sphincters are held with peculiar firmness during muscular efforts, and thus the overload of urine cannot escape through the urethra. If there happens to be a stricture of the urethra, the danger is so much the greater.

The theory of the causation of rupture by the second method is upheld by a new view of the physiology of that viscus. It is maintained that the hypertrophied bladder-walls are as capable of spontaneous rupture as those of the heart and gravid uterus. In experiments on the heart, it is shown that the thinner walled cavities rupture most easily from external violence, but the thicker from their own contractions. The hypertrophy of the bladder on account of stricture may justly be compared to the hypertrophy of the heart arising from valvular lesion. Desnos has demonstrated that the contractions of an inflamed bladder are as sudden as those of striated muscles, and occur very frequently. Distention invites contraction; and when there is an obstacle to the discharge of urine, by way of the urethra, rupture occurs. Even for a long time after anæsthetization, these spasmodic and irregular contractions do not cease. Numerous cases are reported bearing upon this theory, notably one in the hands of Verneuil, where a gentle injection of only 125 grams was immediately followed by the bursting of the bladder; and one in which Guyon was preparing to perform hypogastric lithotomy. The latter had thrown 200 grams of boric solution into the bladder and 300 grams of fluid into the rectal balloon, but the

vesical globe did not appear. A little more fluid was injected into the bladder, and the hypogastrium was distended for a moment, but then suddenly became flat. Death occurred in twenty-two hours, and the necropsy showed the walls of the bladder to be 8 mm. thick, with an anterior perforation 12 mm. long.

The following classification is suggested :

{	Rupture healthy bladder.	{	Traumatic.	{ From direct cause.
				{ From indirect cause.
			By effort.	
{	Rupture diseased bladder.	{	By perforation.	
			By contraction of its walls.	

The term "spontaneous rupture" should be discarded, as it explains nothing and satisfies nobody. "Rupture from idio-muscular contraction" is suggested as a suitable substitute.

Rupture by the action of the muscular walls cannot be prevented by the surgeon in ordinary cases ; but, by emptying their bladders, he can protect his patients against the danger of sudden contractions in the excitement period of anæsthetization. If there is a tight stricture and the bladder is full, hypogastric aspiration should first be practiced. No careful surgeon will puncture a bladder with the beak of a catheter ; but it is possible for a bladder to contract upon the instrument and thus be perforated. That an irritable bladder can rupture itself should warn us against an approved surgical procedure—the distention of small and irritable bladders by forcible injections. Anæsthesia should be complete before any operation on the bladder, so that the liability to contraction may be reduced to a minimum. It is better to do lithotomy almost dry, and to replace supra-pubic lithotomy with perineal, than to subject a patient to much risk of rupture by distending an irritable bladder.

The prognosis is far less grave in extra- than in intra-peritoneal rupture. In the former case, if a free perineal opening is made in the bladder, the chance of recovery is greatly augmented.—*Rev. de Chir.* 1885. No. 11.

F. H. GERRISH (Portland).

II. Diagnosis and Treatment of Intra-Peritoneal Wounds of the Urinary Bladder. By A. W. STEIN, M.D. (New York). After calling attention to the great fatality of these lesions, referring to the fact that in the great majority of cases the coats of the bladder were healthy at the time of the injury, and that neither thickness of the vesical wall nor the absence of distension of the bladder were necessarily a safeguard against rupture, although usually efficient, he reviews the symptoms in detail: inability to walk or stand; severe pain over the epigastrium; incessant desire to micturate with inability to void the smallest quantity of urine, or possibly but a few drops mixed with blood, with constitutional symptoms of great prostration rapidly ensuing; the inconstancy and unreliability of the most constant symptoms are emphasized and the completion of the diagnosis is recommended by digital exploration, in the female through the short urethra and in the male through a small, median perineal incision. In case of a question between intra- and extra-peritoneal laceration, a supra-pubic incision will dissipate all doubt. Should the injury be extra-peritoneal, the incision will have done no harm, and should it be intra-peritoneal, it will have been the initial step to a laparotomy. Referring to the inutility, as curative measures, of catheterization, paracentesis of the recto-vesical cul-de-sac, and lateral cystotomy, he comes to laparotomy, the advantages of which are: (1) that it permits direct inspection of the seat of the lesion and the appreciation of concomitant injury to other parts; (2) that it permits the removal from the peritoneal cavity of extravasated urine and blood; (3) that it permits cleansing and disinfection of the peritoneal cavity, and (4) that it permits the accurate closure of the vesical wound, preventing further effusion of urine—thus meeting all the indications which may secure success.—*N. Y. Med. Rec.* 1886. Feb. 6.

J. E. PILCHER, (U. S. Army).

III. Three Cases of Suprapubic Lithotomy. By Dr. ORLOWSKI (Warsaw). The author calls attention to certain details of the operation of suprapubic lithotomy. Having encountered a case in which the peritoneal fold reached down as far as the pubic symphysis, he insists on the use of a grooved director in incising the abdo-

men, both because it lessens the danger of wounding the peritoneum and because it shortens the operation.

Instead of using hooks and retractors to hold the bladder in the wound, he passes a silk thread for the distance of 3 centimetres through the muscular layer of the bladder-wall, and uses it to draw up the bladder. The main advantage consists in the space gained for operating.

The suture of the bladder should be performed after Gély's method "*en piqué entrecoupée*," and not neglected, as in France. By means of the suture the after-treatment may be shortened by ten days, thirty instead of forty days being then only required for convalescence. He allows infiltration of urine to be the most frequent cause of death, but denies that it is more frequent after suture of the bladder-wound, than without it.

The following are the cases, which present considerable interest:

I. Patient *æt.* 70: great debility; chronic bronchial catarrh; enlargement of prostata; stone in the bladder. Lithotripsy unsuccessful on account of hardness of stone; next day (July 1) operation. Rubber bag in rectum filled with 440 ccm. water; bladder distended with 250 ccm. Incision through abdominal wall and bladder in median line, removal of stone. Two drainage tubes placed in bladder, and one in abdominal wound, which was closed with sutures. Lister's dressing. Evening temperature, 37°5 C.; 3d, dressed; 7th, sutures removed; 11th, tubes, having accidentally fallen out, left off, and catheter placed in bladder. General health very good; 13th, acute pneumonia; 22d, death. Wound was in good condition. No post-mortem.

II. Case of stricture of urethra, *æt.* 33. Patient having introduced elastic bougie, No. 14, fell asleep, and on awaking found it had entered the bladder, July 22; 28th, operation, similar to I., but that bladder-wound was sutured with catgut (Gély's suture); eight sutures. Catheter retained in bladder; 30th, catheter changed. August 1, wound dressed and catheter renewed. From 3d to 10th urine flowed through the wound; 12th, catheter removed; 17th, dismissed cured.

III. Patient *æt.* 64; lithotripsy one year and a half and again one

week previous to admission. Great pain and debility. Passes bloody urine every ten minutes. Temp. 39° C. Pulse 110, weak. Enlarged, painful prostate; cystitis; 30th March operated. Peritoneum descending nearly to symphysis. Bladder emptied of a stone and fragments of former stone. Suture of bladder with silk. Catheter left introduced. Iodoform dressings. Temperature 39° C. April 4th urine flows through wound. Dressings renewed daily. General improvement, temperature normal. April 9, catheter removed. May 5, abscess of scrotum incised; 10th, wound of abdomen closed, except a small fistula, which remained; 26th, dismissed, greatly improved.—*Deut. Zeitschr. f. Chir.* Bd. 23. Hft. 1 and 2. Dec., 1885.

IV. The Flaying of the Male Genital Parts. By Dr. O. KAPPELER. The author gives nine cases (among them two new ones of his own) of injury to the male organs consisting in the stripping off of the skin covering them. In all cases the patient was caught by some revolving piece of machinery, his clothes torn off, and with them more or less of the skin of the genital organs; only in one case these organs themselves were injured. No deaths occurred.

The object of the author is to throw some light on the prognosis and treatment of such accidents.

In his own two cases recovery ensued by the union of the inner membrane of the prepuce with flaps taken from the skin of the neighboring parts.

In case, then, that the internal lamella of the prepuce exists and can be turned back, with or without incision in the median line, and if there is sufficient skin of the scrotum or of the mons pubis present, to permit of a union with it, recovery progresses without further assistance, and without loss of urinary or genital functions.

If the skin of the scrotum and mons pubis be wanting, still a good recovery is possible, especially with the help of plastic operations, but the penis, though it may perform its functions, will be dwarfed—provided the internal preputial layer be preserved.

If the internal membrane of the prepuce be torn off as well, little is to be expected in the way of restitution. Hard cicatrices cripple the member and prevent coition. In these cases transplantation is moreover extremely difficult, as gangrene of the flaps almost always occurs.

As to injuries to the scrotum, a very little scrotal skin suffices to cover the testicles.

If no skin at all be present the testicles are gradually—in the course of a week—drawn up to the external inguinal ring by the action of the cremaster muscle. In this case the testicle may pass under the pubic skin, or heal by cicatrization, but it is also possible that the latter process is long delayed, and that cicatricial pressure necessitates the removal of the testicle.

Primary plastic operations are indicated, as soon as the entire skin of the scrotum has been torn away; secondary operations become necessary if the testicle remains without cicatricial covering.

In both cases of the author's coition was possible, but the generative functions had ceased on account of azoöspemia. The latter fact is difficult of explanation since no atrophy of the organs was noticeable.—*Deutsche Zeitschr. f. Chir.* Bd. 23. Hft. 1 and 2. Dec. 1885.

W. W. VAN ARSDALE (New York).

V. Alveolar Sarcoma of the Bladder; Operation. By Mr. Langton (St. Bartholomew's Hospital). The diagnosis of this case was made partly by the aid of the sound and partly by the character of the hæmaturia (sometimes absent, and always worse toward the end of micturition). After performing median urethrotomy, Mr. Langton was just able to reach and remove by the use of a steel scoop a tumor the size of a walnut, growing from the bladder wall one inch and a half behind the prostate. The patient, a man æt. 25, made a good recovery. The tumor was composed of a number of cell-containing alveoli.

The author remarks on the necessity for suprapubic incision in cases of tumor springing from the anterior wall, and also discusses the nature of the various forms of vesical new-growths. In his case the situation had been determined by the greater resistance to movement of the sound on the left side of the base of the bladder.—*Lancet.* Dec. 28. 1885.

J. HUTCHINSON, JUN. (London).

VI. Treatment of Spasm of the Sphincter Ani by Forcible Dilatation. By T. PRIDGIN TEALE, F.R.C.S. Speaking of the use of dilatation in painful ulcer of the anus (fissure) Mr. Teale says:

"It is now some twenty years or more since I first heard of the then new method of forcible dilatation of the sphincter ani as a substitute for division by the knife. From that time I have abandoned the knife, and have invariably employed dilatation alone."

The advantage of this mode of treatment Mr. Teale explains as follows: "In the first place, it has introduced a more exact, and, as it seems to me, a more scientific method of dealing with the variable conditions of sphincter which are found in such cases. The educated dilating fingers of the surgeon have a far better consciousness of the amount of resistance to be overcome, and of the degree of the relaxation to be demanded and attained, than can be attained by the use of the knife."

The second class of cases in which Mr. Teale dilates are pure cases of spasm of the sphincter, causing habitual constipation, long delay at the water closet, retention of flatus in the colon, and colicky pains in the left loin, *in which no fissure or ulcer can be discovered.*

The third, cases in which a ring of cartilaginous hardness is felt some distance from the anus, far more unyielding than the ordinary sphincter in fissure, and needing all the power of, sometimes proving almost too much for, the surgeon's fingers to break through.

The fourth class of cases is that of *slight internal bleeding piles.*

The fifth, cases of deeply extending fistula in which free division into the rectum would involve a risk of permanent incompetence of the anus. Here, after full dilatation, partial slitting up of the fistulous sinus, according to Mr. Teale, suffices. He says: "The enforced quiescence of the sphincter allows the rectal end of the sinus to heal. In attempting this, it is necessary to make the skin opening large, like the base of a triangle, of which the rectal end of the fistula forms the apex, care also being taken to vigorously scrape away all granular lining of the fistulous track by Lister's scraper or Volkman's spoon."

Lastly, Mr. Teale is of opinion that in all operations on the rectum and anus dilatation of the sphincter is an essential, almost an indispensable, element in the treatment.—*Med. Times*, Nov. 28, 1885.

BONES, JOINTS, ORTHOPÆDIC.

I. Treatment of Infantile Paralysis. By Dr. WILLIAM MURRELL (London). During the acute symptoms, which last generally three or four days from the onset of the attack, and are marked by febrile disturbance—an elevation of temperature of three or four degrees—the author advocates rest in bed in a darkened room and the lightest possible diet, such as peptonised milk, or milk and soda water. To cut short the fever he recommends tincture of aconite, four or five minims in two ounces of water, one teaspoonful to be given every hour for three hours, then every alternate hour until three more doses are taken, and subsequently every three or four hours until the temperature is normal. Convulsions should be treated by large doses of bromides by mouth or rectum.

When the acute stage is over the child is allowed to get up and is placed on a liberal diet.

Counter irritation is applied to the spine, either by small blisters or by tincture of iodine, and physostigma in one fiftieth of a grain dose of the extract taken three times a day, and the frequency of administration increased until one pill is taken every three hours. After the first six weeks the $\frac{1}{200}$ of a grain of phosphorus should be added to the physostigma; the use of these drugs should be continued for many months.

But the point of Dr. Murrell's treatment lies in the employment of massage, which should be used, not only to the spine and back, but to the paralyzed limbs. The methods known as *effleurage*, *friction*, *pétrissage* and *tapotement* are particularly recommended by him, and applicable in sittings of ten minutes each from once to six times a day.

The *rationale* of this line of treatment Dr. Murrell explains as follows: "It is true that we have to deal with a condition dependent, pathologically, on degeneration or destruction of the large multipolar ganglion cells of the anterior cornua, but if we can only keep up the nutrition of the parts in the affected limbs until other cells in the cord take on the function of those which are useless, the patient will be restored to health."

This keeping up the nutrition is evidenced by a rising of tempera-

ture in a limb after massage, and by the contraction of muscles by means of electricity, both of which points should be tested after every sitting.—*Lancet*. 1885. Dec. 26.

II. Treatment of Spurious Valgus in the Female. By F. KING GREEN (Bath). This consists in supporting the flattened instep directly from the hip, an India rubber accumulator being introduced to render the support elastic and equable.

The apparatus consists of a triangular shaped piece of stout jean, ten inches by three and a half, attached by its base *within* the shoe to the outer side, about half an inch above the junction of sole with outside leather. The sole of the foot rests upon this piece of jean, which, when tension is made upon it by the cord above, gives the requisite support to the arch of the foot. An extra stout, brown leather shoe-lace is now firmly bound to the apex of the triangular piece of jean below, and passed through a ring (the outstanding ring of a jack-rod) which projects from the garter, and still higher is connected by means of another ring with a piece of india rubber cord one third of an inch thick firmly fixed above to the front and back of the corset by a Y shaped piece of strong webbing. The amount of elastic support to the instep can be regulated to a nicety by the patient herself when attaching the boot lace to the ring of the elastic cord.

Mr. Green recommends a broad belt suspended from the shoulders by braces as a substitute in the male for the part played by the corset in the female.

The great advantage of Mr. Green's apparatus over any others that we are acquainted with for the treatment of flat foot, lies in this: the *amount* of support required can be regulated to a nicety by the patient herself, who can tighten or loosen the cord attached to the jean below at its point of junction with the ring of the elastic cord. This advantage cannot be overrated, and has been fully appreciated by the patients on whom I have applied the apparatus at the National Orthopædic Hospital in Great Portland Street, London.—*Lancet*. 1885. Dec. 26.

W. J. ROECKEL (London).

III. Non-union of Fractures with a Consideration of Some Modern Methods of Treatment. By G. R. FOWLER, M.D. (Brooklyn, N. Y.) Classifying the conditions under which non-union is found as (1) delayed union, (2) union through the medium of fibrous connecting bands and (3) pseudarthrosis, he proceeds to consider the etiology under the heads of (I) constitutional causes: (*a*) rachitis, (*b*) syphilis, (*c*) tuberculosis, (*d*) general carcinoma, (*e*) scorbutus, (*f*) pregnancy, (*g*) chronic alcoholism, and (*h*) acute infectious fevers; (II) local disturbances: (*a*) excessive comminution of the fragments, in which cases, ultimate non-union is uncommon and pseudarthrosis still more rare; (*b*) considerable displacement of the fragments, occurring from a failure in reduction or inefficient reduction, the callus from the two extremities of the bone not meeting; (*c*) interposition of soft parts between the fragments, a more common cause of non-union than formerly supposed; (*d*) too early moving of the fragments—here pseudarthrosis is most frequently found—and (*e*) cases for which no rational explanation can be found. The methods of treatment may be considered under two heads: (1) Non-operative methods, consisting of (*a*) rubbing the ununited ends together and applying a fixed dressing; (*b*) injection of irritating fluids or subcutaneous puncture, which are open to the objection of not being applicable to fractures in the vicinity of joints and (*c*) the "percussive method" of H. O. Thomas, consisting of percussing the parts about the seat of fracture with a small copper mallet faced with rubber for from five to ten minutes at a time at intervals of forty-eight hours or longer until undoubted evidence is afforded of a renewal of active hyperæmia and engorgement of the parts; it is believed that all cases of the first class and most cases of the second, when not due to constitutional causes, will be amenable to this treatment. (2) Operative methods, mainly directed to cases in which non-union is due to (*a*) longitudinal dislocation of the fragments and the occurrence of adventitious processes of the aponeurotic structures leading to muscular attachment above and below the false point of motion; (*b*) interposition of the soft parts between the ends of the fragments; (*c*) oblique fracture with smooth surfaces and (*d*) cases of osteomyelitis, necrosis and abscess about the ends of the fragments. Referring to the ivory peg method of Dieffen-

bach and its modifications without approval, he describes Brainard's method of perforating the fragments with a small drill, and this failing, he would freshen the ends of the bone and unite the periosteum, uniting the fragments by wire suture or not, according to the exigencies of the case, all with antiseptic precautions. Cases in which this can not be done because of excessive loss of bone substance, should be treated by bone transplantation according to the methods of Macewen or von Nussbaum.—*N. Y. Med. Jour.* 1886. Feb. 6.

J. E. PILCHER (U. S. Army.)

GYNÆCOLOGICAL.

I. The Recurrence of Parovarian Cysts After Simple Puncture. By M. TERRILLON (Paris). In a rapid review of the subject it was established that MM. Panas and S. Duplay's observations in support of the definite cure of these cysts by simple puncture, referred to tests which had not been followed long enough. Kœberlé first and then MM. Lucas-Championniere, Terrier and Polaillon maintained that simple puncture was most often only palliative and that ovariectomy had to be resorted to. This was also M. Terrillon's opinion and he supported it by seven observations of his own, by the results of the résumé of observations published up to the present, made in a thesis by one of his pupils. In all his observations, M. Terrillon, from the fluid analyzed, showed the characteristic composition, limpidity, little solid residue and absence of free albumen.

Obs. I. *Parovarian cyst. Two punctures. No return six months after.* Woman æt. 51. Observed the tumor two and a half years. Sept. 5. 1883, puncture; gave 13 litres of pale yellow fluid; Oct. 1884, a second tapping gave 11 litres of the same liquid. Six months afterwards, no appreciable return.

Obs. II. *Parovarian cyst. Two punctures. Recurrence probable.* Puncture. Apparent cure for seven or eight months. Second tapping October, 1884. On recent examination a slight commencing tumefaction.

Obs. III. *Parovarian cyst. Puncture. Return. Ovariectomy. Cure.* Woman æt. 24. The tapping gave 8 litres of limpid liquid. Return in fifteen or eighteen months. Ovariectomy. No adherence; no pedicle;

peeling off from the broad ligament easy enough; Fallopian tube and ovary removed with the cyst. The intra-abdominal wound was constricted by suture with several threads and left in the abdomen. The patient left the hospital quite cured in five weeks.

Obs. IV. *Parovarian cyst. Puncture. Return. Ovariectomy. Cure.* Woman $\text{aet. } 32$. Puncture. Return in twenty-two months. Ovariectomy. Operation rather difficult; had to give up the removal of the whole sac; the borders of the part left sutured to the abdominal wall. It retracted so rapidly that the patient left cured on the twenty-fifth day.

Obs. V. *Parovarian cyst. Puncture. Return. Ovariectomy. Cure.* Woman $\text{aet. } 31$, married. After the second tapping, examination of the abdomen revealed the existence of a second cyst and of uterine fibrous bodies. Another recurrence took place, when ovariectomy was performed and the patient cured.

Obs. VI. *Parovarian cyst. Two tapings. Return.*

Obs. VII. *Parovarian cyst. Puncture five months ago. No actual return.*

In considering these observations with all those published, which do not give more than ten or twelve cures by simple puncture in cases which have been watched for a long enough time, one may say that in parovarian cysts, cure by simple puncture is rather the exception and recurrence after the tapping the rule.

M. DESORMEAUX has been able to observe sufficiently long three patients who have remained cured of parovarian cyst; two after puncture and iodized injection, and one by spontaneous inflammation and disappearance.

M. TERRIER had seen but one case of cure after puncture, and M. Terrillon's communication only confirmed his ideas. He was astonished at hearing of parovarian cysts included in the broad ligament. Neither himself nor MM. Lucas-Championnière and Perrier had met such—there was always a pedicle more or less broad.

M. TERRILLON. The cases of inclusion in the broad ligament are very rare, but there are examples in the work of Hégar and Kalténbach.

M. TERRIER remarked that some patients remain cured for years after puncture of a large cavity of a multilocular cyst. He had ope-

rated three years after puncture on a dermoid cyst of the ovary, the patient having had two children in the interval. He had several times seen a multilocular cyst remain stationary after puncture—there is generally in these cases a large cavity and a small polycystic mass.

M. TH. ANGER had twice performed ovariectomy for parovarian cysts refilling after puncture. One of the patients was cured, the other died. In the last the ovary, quite distinct from the cyst, was left in the abdomen; it became inflamed, severely painful, and at the autopsy was found peritonitis and a suppurating ovaritis.

M. CHAUVEL had seen again this year a patient who had been tapped in 1882 for a parovarian cyst and who presented no trace of a return. She was before the Society in July, 1882.

M. POLAILLON in 1880 punctured a parovarian cyst which gave 8 litres of pure limpid liquid. The woman seemed cured for 3 years, then abdominal pains came on, and ovariectomy was performed five years after the puncture. The cyst was sessile and not included in the broad ligament, the base could not be removed and was sutured to the abdominal wall. The patient was cured by suppuration and retraction of the cavity.

II. Vaginal Hysterectomy for Cancer. By M. TRÉLAT (Paris). The case of a woman *æt.* 38, who had had six children and two miscarriages. Last winter complained of dulness and wasting. Chronic metritis recognized. Some months afterwards a recent epithelioma of the neck of the uterus was recognized. The uterus large and very mobile. Vaginal hysterectomy was decided on, because of the recent onset of the affection, which gave more hope of survival, and of the size of the uterus, which led one to fear its encroachment.

Operation July 2. The patient sat up the second day. The first tube was removed on the fifth and the second on the eighth day, with all the vaginal dressings; then only washings of perchloride solution soon replaced by chloralized water, because of the smarting and irritation produced by the perchloride. The patient had been up now for five days, and would be considered as cured.

From the operating points of view, the pulling down of the uterus was very easy, as well as its separation from the bladder and rectum. To enter the peritoneal cavity the cul de sac must be opened by a

pair of scissors, because the finger has greater tendency to tear than to perforate. The uterus was very large, and could not be circumscribed with the finger; but with difficulty it was possible to pass the ligatures round the broad ligaments, and this is certainly the most laborious part of the operation, and requires modification. Before dividing the broad ligament it must be secured by three or four ligatures in chain, to combat its elasticity, which, in this case, caused the ligatures of the two sides to slip, after division of the ligaments, so that it became necessary to ligature separately all the vessels which were exposed.

Two histological examinations at the College of France and at the Charité showed the existence of a prominent epithelioma, lobulated horny and mucous, limited to the inferior third of the neck. The patient is, therefore, in the best condition for a permanent cure.

M. TERRIER gave some details of a second vaginal hysterectomy which he had lost. The friability of the neck had rendered the pulling down very difficult and fruitless; even after freeing it before and behind, traction of the body by Museux' forceps only brought it down after destruction of the cellular adhesions which held it at the back. The broad ligaments were divided after placing on each two ligatures in chain, which was insufficient. However, on careful examination, the stoppage of hæmorrhage seemed perfect. Drainage and iodoform dressing were employed. As an accident of the operation, an omental hernia was produced. For three days the patient progressed well, in spite of rapid pulse and disturbance; then a pallor of the face was observed, indicating internal hæmorrhage; the condition became worse, and the patient died on the seventh day from subacute peritonitis. At the autopsy a litre of blood was found in the peritoneum, the hæmorrhage coming from the upper part of the left broad ligament of which the ligature had given way. In this case M. Terrier regretted that he had only used two ligatures for the broad ligaments instead of three at least, and that he had employed, instead of simple silk, silken cord, which fastens badly and does not remain tight. As regards the hæmorrhage, it is especially necessary to guard against the vaginal arteries, altogether at the lower part of the broad ligament, which may easily escape. The specimen showed epithelioma of the

neck, some doubtful portions had been left, and the glands were enlarged up to a certain height of the broad ligaments.

III. Removal of Two Sessile Cervical Fibroid Tumors by Abdominal Section. By F. A. KELLEY, M.D. (Philadelphia). The operation was done as a forlorn hope to relieve a patient rendered desperate by protracted hæmorrhage and abdominal pains, caused by two fibroid tumors of the cervix uteri, an operation for the relief of which had been refused by several distinguished surgeons. On abdominal section the tumors were found to be broad-based flat fibroids, deep down in the areolar tissue. The peritoneum was incised and stripped off from the tumors which were then enucleated and torn loose with an ecraseur. The free hæmorrhage following their removal was controlled with a Pacquelin cautery, ligature at such a depth in the pelvis being impracticable, and the cauterization itself being very difficult, and rendered justifiable only by an accurate knowledge of the anatomy of the parts. The toilet was made with great care and the abdominal wound closed by silver sutures, leaving a curved drainage tube about a half inch in diameter at the lower angle, draining the retro-uterine cul-de-sac. Through this tube the pelvis was irrigated daily with warm carbolized water, to which the writer attaches the utmost importance in securing the favorable result.—*Am. Jour. Obstetrics.* 1886. Jan.

IV. Artificial Vesico-Vaginal Fistula for the Cure of Chronic Cystitis. By Dr. A. V. MACAN (Dublin). With the same success that has attended perineal drainage of the bladder, the author has made a free opening between the base of the female viscus and the vagina in two cases. The first is especially noteworthy from several points of view.

A woman, æt. 38, had suffered for five years from a vesico-vaginal fistula (high up), as a result of severe labor. A large calculus had formed (owing probably to the stagnation of urine below the fistula), which was removed with much difficulty through the urethra by the use of lithotritry and Bigelow's evacuator. Three months later Dr. Macan succeeded in closing the fistula after two operations; but as chronic cystitis came on and resisted all ordinary treatment, the vesico-

vaginal septum was divided and the two mucous membranes sutured in order to prevent both hæmorrhage and premature disuse of the wound. Much thick membrane, due to the irritating action of the urine, was subsequently removed from the vagina below the fistula. The cystitis gradually subsided, and in February, 1885, the opening, which had existed for four months, was closed. "The cystitis was thoroughly cured."

The writer observes that had he known the size of the stone he would have performed vaginal lithotomy in preference to lithotrixy. —*Dublin Journal of the Medical Sciences*, October, 1885.

SYPHILIS.

I. Syphilitic Pseudo-Paralysis in Infants. The recorded cases of this obscure and rare affection are chiefly due to French observers, especially MM. Parrot and Dreyfus, Valleix in 1834 being the first to notice it. In the present clinical review it is asserted that there are always present certain features which help in its diagnosis from infantile and diphtheritic paralysis. These are (1) occlusive limitation to the extremities (generally to both upper ones), (2) pain and more or less swelling (especially towards the end of the affected limb), (3) good muscle-reaction to electricity and perfect retention of sensation. Several of the infants presented evidence of inherited syphilis (including swelling at the epiphyseal lines in the "paralyzed" parts), in other cases syphilis was inferred from the parents' history, whilst a third group included instances of powerlessness in a limb after one of its chief bones had been fractured or some other traumatism sustained. In the latter syphilis was assumed as a hidden cause. This surely seems unnecessary. The inability of young children to localize the pain felt after a traumatic lesion of arm or leg (e. g., fractured clavicle or displacement of the articular ligament) and the resulting powerlessness of the whole limb, are matters of every day observation.

The paralysis in the more undoubted cases comes on insidiously during the first few months of life, and has been twice noted at birth out of a total number of fourteen cases mentioned by Dreyfus. It usually persists until the infant's death, a fatal issue being almost constant in those affected at the hospital in which M. Parrot made his

well-known researches. If, however, mercurial treatment is carried out, with great care as to feeding and hygiene, it appears that several cases had recovered. M. Millard asserts that these infants tolerate well mercury given by the mouth (in the form of syrup de Gibert).

It may be that many of the cases of "syphilitic pseudo-paralysis" are of a reflex nature and due to weakness or actual displacement at epiphyseal line, and this view is confirmed by the greater frequency of the affection in the upper limbs. Both the cause and the effect may be at times symmetrical.—*Progrès Médicale*. 1885. Nov.

II. On the Recurrent Chancre, Etc. By J. HUTCHINSON, F.R.S. (London). A fact of importance from several points of view was almost simultaneously noticed by M. Hutchinson and Professor Fournier (London Hospital Reports, 1866, and *Archiv. Gén de Méd.*, 1868), that syphilitic subjects may, at a varying period, from infection, usually a few years, present indurated sores which so closely simulate fresh Hunterian chancres as to mislead even careful observers.

The recurrent chancre ("pseudo-chancre induré" of Fournier) is nearly always solitary, and is usually situated on the prepuce or some other part of the penis, though it has more than once been observed on the scrotum. There is of course no reason why it should not occur on the site of extra-genital primary sores, and in one of the author's cases it was found in the scar of a former vaccination-chancre. A bubo is a very rare accompaniment, but in other respects the resemblance is very close, the sore being sometimes very hard, as a rule rounded or oval, and secreting little if at all. The recurrence is never followed by the appearance of secondaries, may develop without the least fresh exposure to contagion, may be accompanied by other late or tertiary lesions, and, as a rule, quickly subsides under specific treatment. It may, however, relapse again and again. It is an interesting example of what Mr. Hutchinson has urged for long with regard to the phenomena of the tertiary stage, that they are often a sort of relapse or re-development in the site of early manifestations of syphilis (e. g., secondary periostitis and tertiary periosteal gummata).

It is of importance to remember in practice that the penis is no more exempt from tertiary ulcers and indurations than is any other part of the surface of the body.—*Medical Press*. 1885. October 28.

III. Treatment of Syphilis with the Aid of Sulphurous Waters. By MM. LAMBRON and DORT. The late M. Lambron and his successor have published the results of their extensive experience at the springs of Luchon; and although nothing really new will be learnt from them as to the methods of treatment, it is interesting to note how far they confirm the prevalent ideas as to the use of sulphurous waters. Mercury and iodide are respectively their main supports in the treatment of early and late syphilis, sarsaparilla is prescribed with each, and frequent sulphurous baths and potions are added, the latter being taken at the same time in the day as the specific drugs. Prolonged treatment (at intervals for two years at least) is advised. The iodide is at first given in seven grain doses, and its taste, as of the nauseous bromide of potassium, is to a great extent concealed by the use of strong syrup of bitter orange-peel. From personal experience the annotator can confirm this statement, and it is a pity that the preparation has not been transferred from the French pharmacœpia to our own.

The authors agree with the old doctrine that a day at the mineral baths acts as a touchstone to reveal latent syphilis, that the use of the waters increases the specific effect of mercury and iodide, whilst it aggravates primary sores or acute secondary lesions. Mercurial salivation and syphilitic cachexia are both improved by a visit to Luchon; and when mercury has been given for long and seems to have lost its effect the use of sulphurous waters will, it is asserted, "break up the combination of albumen and the metal" and set the latter free to act. It will be noticed that these conclusions are hardly more free from apparent contradictions than those of former observers.—*Gaz. des Hôpitaux*. Oct. 24 and 31. 1885.

J. HUTCHINSON, JR. (London).

LIPOMA TESTIS, OR A LARGE ACCUMULATION OF FAT IN THE TUNICA VAGINALIS.¹

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LIPOMATA of the spermatic cord are rare enough to always attract attention, but lipomata of the testicle are of such exceeding rarity that, believing that I have had a case which deserves this designation, I desire to put it on record and make it the basis for a few comments.

J. K., æt. 40, was referred to me by Dr. Conrad Diehl early in September, 1885. Patient had noticed an almost painless, slow but continuous enlargement of the right testicle for the past eighteen months. It was then about the size of a coconut, and caused inconvenience only by its weight and bulk.

On examination the scrotum was filled by a large mass which crowded the left testicle into a small space at its upper part. This tumor was solid, yet soft, not tender except as the right testicle—which was in its upper part—was pressed upon. On handling it an ill defined fluctuation was noticed. By exploratory puncture all suspicion of fluid was removed. Patient had every appearance of robust health, and the idea of malignancy could not be entertained. Over the surface of the tumor the scrotal integument moved with perfect freedom. An exact diagnosis was not ventured, though there was strong suspicion that the mass was fatty; but radical operation was advised and consented to.

October 4, patient went to the Buffalo General Hospital, where I operated, Dr. Diehl and the house staff present and assisting. By a free incision the tunica vaginalis was exposed; its appearance was not typical of anything save distention from within. A second free incision was made through this and a

¹ Read before the American Surgical Association.

mass of densely packed fat was revealed. This was very slightly adherent to the interior of the tunic, and was turned out without difficulty after enlarging the incision. After completely shelling it out I found, on separating its lobular masses with the fingers, the right testicle not merely imbedded in its upper part, but incorporated with the fat by apparently intimate tissue connection. It was moreover supplied with blood both from the testis and from the cord. The cord seemed to enter the tumor and then pass in its substance for about two inches before reaching the testicle. At a loss to account for so much fat I carefully explored the external ring for evidence of past or present hernia, but could find none. The ring and canal were no larger than on the other and normal side.

Finding the fibrous trabeculae and blood vessels radiating from the testicle out into the fatty mass so numerous and distinct, I decided to remove the whole *en masse*. The balance of the operation then simply resolved itself into a castration which was made in the conventional way. Recovery followed without incident.

The entire mass after removal weighed just three pounds. On dissection nothing further could be made out than I have already stated. I was unable to come to any positive conclusion as the exact point of origin of the adipose mass. While the blood supply from the cord might indicate one origin, the equally evident blood vessels from the testicle pointed as strongly to another.

In fact, I consider it impossible to say from what part of the spermatic tract this neoplasm originated; and while it would be of pathological interest to know, I hold it yet of small clinical importance in this case, and deem myself clinically correct in speaking of the case as lipoma testis, or, if the term be preferred, lipoma intra tunicam vaginalem.

Realizing the rarity of the lesion I was led to make a careful study of its literature, and distrusting the resources of my own library, I enlisted the aid of Dr. S. S. Adams, of Washington, who devoted a fortnight to a search through the indices and files of the Surgeon General's Library. As the result of his labor he could find but three cases whose titles allied them to that which I have reported. As will be seen not one of these properly belongs here.

In the Dublin Medical Press, 1847, XVII, 56, is a paper by J. A. Orr entitled—"Operation for lipoma of the testicle after the inhalation of sulphuric ether vapor: 'J. Dillon, æt. 47, admitted to City of Dublin Hospital, October 17, 1846, for lipoma of right testicle, coming on after an attack of orchitis, the result of a gonorrhœa contracted eighteen months before!'" Orr goes on to speak of its granular and fungous aspect, and without further use of the term lipoma, and without saying anything of the method of operating, the specimen obtained, or even of the result, he devotes the balance of his paper to a consideration of the action of ether. Moreover this seems to be one of those cases to which I allude further along, where the terms lipoma and fungus of the testis were indiscriminately used.

J. Morgan published in the Dublin Medical Press and Circular, 1867, IV, 546, a "Clinical Lecture on Lipoma Testis." His case is further described as "Lipoma of the testis in an advanced stage and aggravated by neglect and irregular living." It may be briefly summarized for present needs thus: Right testicle acutely inflamed after injury, inflammation subsiding into chronic state. After seventeen months appeared discoloration of skin, thinning of same, ulceration and discharge; after this a fungous formation. In the further particulars of the case nothing appears indicating a fatty condition of the parts.

Turning to other sources, and not looking merely for clinical reports, there is scarcely anything to be found. I note, however, that Callisen referred distinctly to lipoma of the testis: "Si ex superficie albugineæ vel ipsa tunica vaginali excrecentiæ surgunt totum demum testem involventes, et scirrhum seu fungum mentientes, ipsius tamen testis substantia parum aut vix de statu naturali aberrante; malum naturam lipomatis sequitur, vix unquam in scirrhum et carcinoma abiens." (*Systema Chirurgiæ Hodiernæ*, 1800, II, 145.)

Curling, in Todd & Bowman's Ency. Anat. and Phys., (article Testicle, Abnormal Anat.) says: "Collections of fat in the scrotum have been known from the time of Galen by the term *steatocèle*. I suspect they all originate from the spermatic cord. In examining the testicles of a young man who died of pleurisy I found a quantity of fat along the cord and around the

epididymis, and some also beneath the tunica vaginalis covering the posterior part of the testicle. When developed in considerable abundance this deposit sometimes forms a tumor in the groin or in the scrotum. A tumor of this kind has been taken for an omental hernia." Such tumors were known by Pelletan as *hernies graisseuses*.

An interesting case of large, fatty tumor in the scrotum originating in the spermatic cord, was seen by several surgeons in 1844, much difficulty having been experienced in making out the nature of the swelling;—this case is fully reported in Curling's Diseases of the Testis, 4th Lond. Ed., 1878, p. 559—and is briefly as follows:

Patient æt. 43, of spare habit, perceived an enlargement in left side of scrotum which was taken for a hernia; reduction was attempted by Lawrence and failed; it was then diagnosed as irreducible omental hernia. Brodie and Harding failed to make out its exact nature. Tumor continued to increase. After fourteen months Curling found it to be the size of a large orange, soft and inelastic, connected above to the thickness of the spermatic cord. The testicle was distinct and situated below and to the inside. On rising in the morning it swelled and felt heavy and painful; before evacuation tense and painful, afterwards resumed its former state. Curling thought it an adventitious growth in the scrotum. In twelve months it attained the size of a melon with the testicle in front. Brodie, Travers and Lawrence unable to diagnosticate, but united in commending its removal. Lawrence, assisted by Travers, operated. It was impossible to save the testicle, so the whole mass was removed. Tumor six by eight inches, partially lobulated, adipose tissue, originating high up in the spermatic cord. Recovery. Four years later Curling removed from the same patient a small lobulated fatty tumor, size of a chestnut, which had probably escaped removal at the previous operation, from the spermatic cord. Ten years after the first operation two other small fatty tumors were removed by Curling. These were situated a little lower.

I give this case here rather because it is instructive than because it belongs here, since it makes no pretence to being a case of lipoma testis. Since then Kimball (of Lowell [?] Bost.

M. and S. Jour., exact reference unknown to me) and Jobert (*Gaz. Méd. de Paris*, 1850, p. 558) have reported authentic cases; in the latter the tumor was of somewhat mixed variety. The obscurity of diagnosis is well shown in that Kimball believed his case to have something to do with an old hernia. Deguise also reports (*Ann. de la Soc. de Chir.* IX.) a case where the tumor was as large as an adult head, had been growing a dozen years, and required an incision of thirty ctm. for its extraction.

Numerous authors state that lipoma of the cord may extend downward and spread over the testicle, and I am not blind to the fact that in my case the fatty growth may have begun in this way, yet when it came under observation there was nothing to indicate such an origin.

According to Follin and Duplay (*Pathol. Externe*, VII, 379), lipomata of the cord are usually stationary and of small size, but in certain cases acquire large dimensions. Developing upward toward the abdomen they may greatly obscure diagnosis. After they have attained great size they usually grow downward. Thus Wilms removed a lipoma of the cord of twenty pounds, Gascoyen one of five and a quarter pounds, and Mr. Lane one of five and a half pounds. In my case, however, the tunica vaginalis was so tensely distended with fat and the cord above it was so natural in size and appearance that I can not avoid the convictions I have expressed.

Moreover Delafield and Prudden state that "lipomata, either pure or in combination with myxoma and sarcoma, may arise from the connective tissues of the spermatic cord, or from the tunica albuginea." (*Path. Anat. and Hist.*, p. 441). This statement, brief as it is, is the only one bearing on my subject that I have found in any of the pathological anatomies.

In looking over various authors of the past century I have been peculiarly struck by the looseness of their phraseology concerning affections of the testis. Thus, as already remarked, lipoma testis and fungous testicle are almost synonymous terms according to their usage; Brodie, Astley Cooper, Samuel Cooper and others as well known, are not free from this fault. It is not, perhaps, incredible that a tense distention of the tunica vaginalis by a mass of fat might lead to atrophy or even

ulceration, and to the formation of an adipose hernia, but in each case that I have alluded to above, where the title would imply a lipomatous condition, nothing of the kind was revealed, but rather one of the true fungous lesions.

Therefore, accepting the cases reported by Kimball, Jobert and Deguise as authentic, they constitute all that I have been able to find, and I may consistently claim that mine is the fourth on record. This rarity of the lesion, coupled with its pathological interest and the obscurity of diagnosis attending such cases, must be my excuse for taking up the time of an Association which yet, I believe, is not above a careful study of small things.

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TWO CASES OF OPERATION FOR PYLORIC STENOSIS.¹

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IT is not my intention to review or compare the different operations which have been devised for the relief of pyloric stenosis. I desire merely to present the results of my experience with the most recent of these operations. I refer to that devised by Professor Loreta, of Bologna, namely, digital divulsion of the pylorus. This operation is intended to take the place of excision of the pylorus, and is, of course, applicable only to cases where the stenosis is due to cicatrization or chronic thickening of a non-malignant character. That such cases exist has been abundantly proven, and the records of pylorotomy, duodenostomy, and gastro-enterostomy all contain cases of this comparatively simple nature.

The operation of digital divulsion was first performed by Loreta on September 14, 1882, and with success. The patient suffered from dilatation of the stomach due to stenosis of the pylorus. The stenosis was believed to be due to the cicatrization of an old ulcer. (I derive my information on many points

¹ Read before the New York Surgical Society, Dec. 22, 1885.

referred to in this paper from a translation of Loreta's article by Dr. Ancona, which is to be found in the *Arch. Gén. de Méd.* for September of this year, and from an interesting article on the same topic which may be found in the *British Medical Journal* for February 21, of this year. The latter is by Mr. Holmes. And in the *American Journal of the Medical Sciences* for April, 1885, is an article by Professor Randolph Winslow, in which the whole subject of pyloric stenosis is very carefully dealt with.)

The method of operating may be briefly described thus: Incision of the abdominal wall to the extent of about five inches on the right side, close to and parallel with the free border of the ribs. Opening of the stomach by a wound three inches long very near the pylorus, and about midway between the two curvatures. The introduction of one index finger through the pylorus, then the introduction of the other index finger, and finally the gradual forcible dilatation of the orifice to the extent of about three inches. Then immediate closure of the stomach and abdominal wounds. The probable immunity from hæmorrhage, the short duration of the operation, and the excellent results which are reported as having followed the practice, would certainly seem strongly to recommend its adoption in suitable cases. I find it impossible to present anything like an accurate statement of the results of all the cases thus far operated upon by this method.

Winslow, in the article already referred to, summarizes the number of operations up to April of this year as six. Four of these were done by Loreta and two others by different Italian surgeons. Of these six cases, two died, but no mention is made of autopsy. The others were all successful. In Ancona's article the statement is made that Loreta claims to have performed the operation twenty-two times and *always* with success. Also that five other Italian surgeons have done the same operation successfully. It is difficult to reconcile these different statements, and I am not able to verify them, as many of the cases have not been published. It is doubtless true, however, that so far the operation of digital dilatation of the pylorus has been very successful, and the mortality low as compared with any other operation having the same object in view.

CASE I.—Marie B. Propes, æt. 39, married, Virginian, was first seen by me in the early part of the present year. She had then been for some months under the care of Dr. F. P. Kinnicutt, at St. Luke's Hospital, who had carefully noted her symptoms and diagnosed dilatation of the stomach due to stenosis of the pyloric orifice.

The patient gave the following history: From 20 years of age up to a year ago she suffered from attacks of what she called "bilious colic." These attacks occurred every few weeks, and were characterized by intense pain in the epigastrium extending to the back and by violent vomiting without blood. About one year ago she began to have frequent attacks of vomiting, these occurring sometimes twice a day, sometimes only once in two or three days. Nearly all food was vomited, and intense burning pain was felt in the epigastrium with continual thirst. For some five months the patient had been confined to bed, and had become very weak and emaciated. For seven or eight years before this period her weight had averaged two hundred pounds. Half of this weight had been lost within one year. Flatulence, eructations of gas, and obstinate constipation had been prominent symptoms for many months. No pulmonary or cardiac symptoms existed.

On admission to the Hospital on February 4, 1885, the patient weighed less than one hundred pounds. The localized distention of the abdomen extended from just below the ensiform cartilage to a point three inches below the umbilicus, and to a point three inches to the left of the umbilicus, and two inches to the right. Over the whole of this region was marked tympanitic resonance on percussion. After emptying the stomach with a rubber tube, a small movable tumor, about the size of an almond, could be felt on deep pressure, one inch to the right of the median line, and two and one-fourth inches above the umbilicus. The patient was put upon a diet of peptonized milk and beef peptonoids, and the stomach was washed out daily. On each occasion the washing was kept up until the fluid returned was perfectly clear. In spite of this lavage, vomiting occurred almost daily more than a month, and when a little rice had been added to the diet, particles of rice could be found in the washing five days after such a meal. Nevertheless, under this treatment the vomiting gradually subsided and the patient's weight steadily increased. The experiment of discontinuing the washing was then tried, but pain and vomiting almost immediately returned.

In this case, then, there was no history of ulceration. The enormous dilatation of the stomach was easily demonstrated by filling the organ with water, and then emptying it. The existence of obstruction at the pyloric orifice was also shown by the return of undigested food many

days after it had been swallowed, and finally a distinct tumor could be felt at the exit of the pylorus. This tumor was believed not to be malignant from the facts that it did not increase in size during the months of observation, that there was no true cachexia, and that the patient increased in weight many pounds while under treatment. No doubt she could have been kept alive with careful treatment, including daily washings of the stomach, for an indefinite period. She was anxious, however, to leave the hospital; was too nervous to manipulate the stomach tube herself; and desired some radical operation.

I desire to state here that the whole of the medical treatment of this patient had been conducted by Dr. Kinnicutt, under whose care the patient was, and who, after consultation, requested me to operate upon the case.

Believing the case to be similar to those reported by Professor Loreta, and in which he obtained such signal success by forcible dilatation of the pyloric orifice, I determined to attempt the same procedure.

On July 3, the patient was put upon a diet of peptonized milk only, to prepare the stomach for operation. On July 6, the day of the operation, the stomach was thoroughly washed out with borax solution at 10 A. M., and again at noon. At 2:15 p. m., irrigation was practised with a solution of salicylic acid 1 part, boric acid 4 parts, and water 1500 parts. Before the second washing the fluid was found to be distinctly acid, and to contain some white material in suspension, which, after settling, left the fluid comparatively clear. The sediment consisted of oil globules, casein, and oval and polygonal epithelial cells. Ether was given at 2:30 p. m. on July 6, 1885, and the operation was conducted as follows: with the immediate assistance of my colleague Dr. Abbe, and in the presence of a number of surgeons and physicians. The surface of the abdomen was thoroughly cleansed. I made an incision about five inches long, from a point one inch below and one and a half inches to the left of the ensiform cartilage, downward to the right, parallel with the border of the ribs. All the tissues down to the peritoneum were divided as rapidly as possible, and all vessels tied. The peritoneum was then incised throughout the whole length of the wound, and the pyloric end of the stomach readily found and drawn out through the wound. No adhesions existed between the pylorus and the liver or pancreas. The small tumor already described was felt at once, and was evidently the thickened wall of the pyloric orifice. The anterior wall of the stomach, nearer the lesser curvature and just to the left of the pylorus, was clasped by two thumb forceps, the blades of which were covered with flannel, and incised to the extent of three inches.

The pyloric orifice was easily found, but it was so contracted that I could not, even when using as much force as I dared, pass the first phalanx of my finger through it. It felt very much like the firm os of a normal uterus. For this emergency I had ready a rectal dilator, which seemed to be well suited for a preliminary stretching, having perfectly smooth, rounded blades. This was easily passed through the pylorus, but so great was the tenacity of the hypertrophied wall that it was only after repeated stretchings with this instrument that I was able to get one finger through. I then passed in the index finger of the other hand, and, by forcibly separating the two for some time, stretched the opening to a long diameter of about three inches. It was then perfectly easy, on looking through the wound in the stomach, to inspect the dilated pylorus. A short tear in the mucous membrane was recognized, and a very little dark blood noticed, but no bleeding vessel. The mucous membrane of the stomach was then sewed with a fine silk, continuous suture, a straight, round needle being used. No bleeding worthy of notice had occurred in making the incision in the stomach wall. The serous coat was united by twelve interrupted catgut sutures introduced after Lembert's method. The peritoneum of the abdominal wound was then sewed with a continuous catgut suture, and deep and superficial catgut sutures were used to close the incision of muscles and skin. Three silver wire supporting sutures, with lead clamps, were used to give additional strength. An antiseptic dressing was applied over all. The operation, from the first incision to the complete closure of the external wound, lasted one hour and eighteen minutes.

The patient bore the operation quite well, and at 6 p. m. her pulse was fairly good. Still the evidences of shock were very noticeable, and from this time on both pulse and respiration rapidly failed. She died six hours after the close of the operation, although every effort was made by the members of the house staff and myself to sustain life.

An autopsy was held in my presence the next day. Excepting the stomach, the various organs were found to be in a healthy condition; the wound in the stomach was found tightly closed, so that on distending the stomach with water not a drop escaped. On opening the stomach it was found to contain some ten or twelve ounces of fluid blood. The mucous membrane of the stomach itself was deeply stained with blood; but no lesion other than the operation wound was to be discovered. The pyloric orifice was widely dilated so as easily to admit three fingers. In the mucous membrane of the pylorus on the posterior surface was a recent longitudinal laceration, about an inch long. This laceration extended through the mucous and submucous coats; otherwise the mucous membrane was normal, and no trace of

old or recent ulceration could be found. Entirely surrounding the pylorus was a thickening of firm fibrous or fibrous and muscular tissue, which had doubtless caused the stenosis, and which had formed the small tumor previously described. The duodenum was found to contain a large quantity of blood, and many ounces of blood were found in the small intestine. The peritoneum, except where cut in the course of the operation, was normal. No adhesions existed at any point.

The behavior of the patient after the operation, together with the result of the autopsy, made it very clear that the patient had died of hæmorrhage, the blood coming from a vessel involved in the tear of mucous membrane found in the pylorus.

CASE II.—Susan Joyce, æt. 52, widow, Irish. The patient was admitted for the first time to St. Luke's Hospital on December 18, 1883. She then gave the following history: from 14 to 19 years of age she had occasional hæmatemesis. At the age of 19, after a severe exertion, she vomited a large quantity of blood during two days. Twenty years ago the patient vomited black grumous material nearly every day for a year, and always had severe pain in the epigastrium after eating. In the early part of 1881 she vomited a large quantity of blood. She was admitted to the hospital much emaciated, complaining of severe abdominal pain, which was much increased after eating, and which extended to the back and right shoulder. The stomach was found to extend to a point four inches below the umbilicus. After a short stay in the hospital the patient was discharged, to be readmitted on April 9, 1885. Since leaving the hospital she states that she has been living upon milk and stimulants, with a little fish and eggs. She had continued to vomit daily. Usually the vomit had been of a dark green color, sometimes mixed with a little bright blood. Constipation had been extreme, no stool occurring without a cathartic. She had been confined to bed for the last six weeks, and had lost flesh and strength rapidly. The patient was found to be emaciated, anæmic, complaining much of thirst and constipation. Tongue coated, and urine scanty. Slight dulness was found at the right apex, and the patient had a cough and occasional fever and night sweats. The stomach was found to be much dilated, occupying the left umbilical, lumbar, and hypogastric regions, extending two inches below the level of the anterior superior iliac spines. Percussion over this area was resonant, with marked succussion sound. A distinct tumor, about one inch long and one-half inch broad, was felt in the epigastric region two and a half inches above the umbilicus in the median line. This tumor was not movable, and was firm and resistant. With the exception of the apex of the right lung the other organs were normal. The patient was put upon a diet of

peptonized milk and beef peptonoids. Her weight at this time was eighty-seven pounds, certainly from thirty to forty pounds less than her normal weight. On April 8 daily lavage of the stomach was begun, the solution used being one of borax, twenty grains to the pint. Under this treatment the patient's weight increased to ninety-nine pounds at the end of June. At this date the capacity of the stomach was 115 ounces.

This patient also had been under the care of Dr. F. P. Kinnicutt, in the medical wards at St. Luke's Hospital, for nearly three months. During that time I examined her, with Dr. Kinnicutt, several times, and we agreed that, doubtless, the original cause of her troubles was ulcer of the stomach, probably situated at or near the pyloric orifice, as indicated by the presence of the small tumor found at that point. It seemed probable, too, that this ulcer had healed, or had become nearly cicatrized, from the absence of hæmatemesis during a long period. The tumor was not believed to be malignant, as it did not increase in size, and as the patient did not present any cachexia, and increased markedly in weight under treatment by lavage. Her case was not a promising one, but there was no reason to believe that her life could be prolonged without surgical assistance, unless she remained a permanent resident of the hospital. I determined, therefore, to make an exploratory operation, and, if possible, relieve the stenosis.

On June 20, the patient's diet was limited to pancreatized milk only, to prepare the stomach for operation. On July 6, the day of operation, the stomach was washed out at 10 a. m., and again at 12:30 p. m. The fluid removed before the second washing was decidedly acid, containing much whitish material in suspension, which did not completely separate. Under the microscope the sediment was found to consist of oil globules, coagulated casein, granular nucleated epithelium, and some mucus.

At 3:30 p. m. the stomach was again washed with the borosalicylic acid solution. The patient was etherized at 4:30 p. m. I had the kind assistance of my colleague, Dr. Robert Abbe, and, during the operation, all possible antiseptic precautions were used. The abdominal wall was incised in precisely the same manner as in the case first reported. All bleeding was controlled, and then the peritoneum was opened as before. The stomach was easily seized, but I found considerable difficulty in locating the pylorus. It was at last made out to be directed upward and somewhat to the left, its ordinary position being occupied by the dilated pyloric end. The stomach wall was then incised to the extent of two and a half inches, the incision being

near the lesser curvature, and close to the apparently thickened pylorus. On opening the stomach an old apparently healed ulcer was felt and seen directly opposite the incision. This ulcer was about one inch in diameter, and its largely thickened edge formed the tumor which had been felt before the operation. The base of this ulcer was firmly adherent to the pancreas behind, and the contraction of cicatrization had given the stomach an hour-glass form. Even then it was difficult to find the pyloric orifice. After a search of some minutes I found it at the upper border of the ulcer, close to the latter, but not involved in it, and directed upward. The posterior edge of the pylorus had been so firmly drawn by the cicatrization of the ulcer that although it was easy, on lifting the anterior edge, to pass the finger through it, yet when the anterior edge was not so lifted, the orifice was completely closed. Had the patient's general condition warranted it, the operation of gastroenterostomy would, I think, have been the better one; but, on account of her age and general feebleness, I did not think it wise to prolong the operation. I thought that by a thorough stretching of the pylorus I could counteract the stenosis produced by the cicatrized ulcer. When the two index fingers were introduced, the pylorus yielded very readily without tearing, so as to leave the exit from the stomach very free. The two fingers were separated during the stretching about three inches. I then at once sewed the mucous membrane of the stomach with a continuous fine silk suture, using a fine, round needle. The serous surfaces were united with a continuous catgut suture after Lembert's method. The abdominal wound was treated as in the first case, and an antiseptic dressing applied.

The time occupied in this operation, from the commencement of the first incision to its complete closure, was one hour and three minutes. The patient rallied very well from the effects of the operation. She slept comfortably nearly all night, receiving small quantities of brandy and ice, and two small hypodermic injections of morphine. But at the end of twenty-four hours her kidneys had excreted only twelve ounces of urine, which was found to contain two per cent. of albumen. Before the operation the urine had been normal, though scanty. From this time on the kidneys ceased to act, and the patient became gradually weaker, and respiration and heart action failed rapidly. She died thirty and one-half hours after the operation, the cause of death being apparently suppression of urine.

At the post mortem examination, which was made the next day, the following lesions were discovered: The left kidney was normal in size; the capsule was adherent at different points; a few small cysts were found in the cortex; the cortex was thin, and the whole organ

congested and fatty ; the right kidney was in similar condition, and an infarction one-fourth of an inch in diameter existed in it ; the upper part of the right lung displayed the lesions of advanced chronic phthisis ; the lower parts of both lungs were congested and œdematous ; recent peritoneal adhesions existed in the immediate neighborhood of the abdominal wound ; no escape of fluid from the stomach had occurred, and the wound in the stomach was tightly closed ; the mucous membrane of the stomach bore plain evidences of chronic gastritis ; posteriorly was a large, ugly old ulcer, about one inch in diameter, mostly or entirely cicatrized ; the base of this ulcer was firmly adherent to the pancreas, and its edge was much thickened ; the pyloric orifice lay immediately next to the right and upper edge of the ulcer ; the orifice was widely dilated, and no rupture of mucous membrane existed ; the stretching seemed to have accomplished the object without injury to any adjacent part.

It is not always agreeable to listen to the details of unsuccessful cases ; but, in relation to new procedures, unsuccessful cases possess a certain value, and I have therefore made these two the subject of my paper. The particular points to which I wish to call attention are the cause of death in the first case, and the manner in which stenosis was produced in the second.

CHOLECYSTOTOMY WITH REMOVAL OF IMPACTED CALCULUS FROM THE DUCTUS
CHOLEDOKHUS COMMUNIS.¹

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ABOUT the middle of July Dr. Heppenheimer, of this city, sent to me Mrs. B., æt., 37, married. A previously healthy woman, about six months ago she began to suffer with severe pain in her right side over the region of the liver. Sometimes she suffered so severely that she was forced to cry out. The pain was also located toward her back. About one month later jaundice set in, and has since remained. Loss of appetite, vomiting, mostly in the morning, and sometimes of a greenish material. The constant pain has weakened her very much, though her nutrition is not so much impaired as one would expect after such protracted and severe suffering. Her color is of a deep greenish-yellow; skin flabby. The expression of her face I should describe as languid and dissatisfied. She is feverish, and often feels chilly, but has never had a marked rigor; stools light in color; bowels tend to constipation; urine icteric; constant pain in her back; sometimes pain in epigastric region; entire loss of appetite; often nausea. As the principal result of physical examination an enlarged liver presented itself. Fulness from fourth intercostal space down to one inch above umbilicus, and from that point obliquely down to the anterior superior spinous process of the ilium the left lobe seems to be proportionally much enlarged. Four inches to the right of the median line a mass about the size of an orange is felt just below the border of the liver; its position, shape, and resistance make it correspond to an enlarged gall-bladder; other organs apparently healthy.

On the 23d of July a longitudinal incision was made about six inches in length through the external border of the rectus abdominis;

¹ Read before the New York Surgical Society, December 22, 1885.

peritoneum opened; gall-bladder not adherent to the abdominal wall; its color light yellowish-green. By aspiration about one and a half pints of a rather thin purulent fluid were extracted; toward the end of the aspiration the same showed a more free admixture of pus; microscopically pus-cells and cholesterin crystals were found. The amount of fluid withdrawn was much more than at first seemed probable from the size of the tumor; that proved, of course, a considerable dilatation of the gall-ducts beyond the gall-bladder itself. After turning the patient on her right side, and pulling the now flabby gall-bladder partly before the abdominal wall while interposed sponges secured closure of the peritoneal cavity, a free incision was made into the gall-bladder, from which more fluid escaped. Neither finger nor instruments, curved as well as straight, reached a stone, though the cavity was explored to the depth of about eight inches. After having enlarged the abdominal wound by an incision at right angles to the first, I passed my hand along the lower surface of the liver toward the duodenum, and there was able to distinguish by the touch a hard round body. In order to get at it with ease, I had to separate the colon from its physiological and pathological adhesions to the lower surface of the liver, and then was able, by gentle pressure and manipulation, to push the stone back into the gall-bladder, whereupon it was easily extracted. Hemorrhage was insignificant on account of double ligature before cutting adhesions, which were most extensive at the lower surface of the gall-bladder. The stone was about the size of a small walnut, oval-shaped, smooth, without facets, consisting of pure cholesterin.

The patient was then again turned on her right side. The bladder was irrigated with a weak solution of boro-salicylic acid; the gall-bladder closed by triple rows of Lembert sutures, and, finally, the abdominal wound sewed up by deep peritoneal and superficial sutures; light dressing of iodoform gauze.

The operation lasted more than two hours, and the patient was in collapse immediately after it, but soon rallied, and in the afternoon had a moderately good pulse, with a temperature of 101° — 102° .

The principal features of the following days until her death, which occurred on the morning of the 26th, three days after the operation, were these:

Vomiting, gradually increasing in severity, sometimes with pus; on the second day, with free admixture of blood; no bile. One large clot, about three inches long, looked as though it might have come from the bile-duct; in one place it consisted mostly of fibrin, and was somewhat constricted; the remainder being apparently a more recent coagulum. Microscopical examination showed much columnar epithe-

lium caught in it. Urine became quite scanty, containing albumen and epithelial and hyaline-granular casts, which were not present before. Abdominal pain and tympanites moderate; temperature gradually increasing to 104° on the third day. The fact that the vomit contained no admixture of bile, and the stools which were occasionally passed, had retained their grayish color, led me to assume that in some way the flow of bile into the gut might be interfered with. I therefore, on the 25th of July opened the abdominal wound, and finding safe adhesions between the gall-bladder and parietal peritoneum, opened the former, giving exit to a considerable quantity of green bile. The bad symptoms continued in spite of this, and on the morning of the 26th the patient died, having a temperature 108.2° ; quantity of urine during the last twenty-four hours was twelve ounces, about the average of the days before.

The autopsy made on the same day was only conceded in reference to the abdomen. The liver had, within those few days after the operation, returned almost to its normal size. The whole system of gall ducts was much distended; the ductus choledochus, which might have admitted a finger, ended with a round lacuna within the walls of the duodenum, where apparently the impacted gall-stone had been located. Several small openings led from here to the gut, which all along the small intestine was filled with a brownish, chocolate-colored material, similar to that vomited during life. The essential points of the microscopical examination, which I owe to the kindness of Dr. Porter, pathologist to the Presbyterian Hospital, were these: "Hepatic cells in a state of granular and fatty metamorphosis, which had completely destroyed their identity. There were also marked biliary pigmentation and slight interstitial thickening. The sections of the liver presented the appearance common to acute yellow atrophy of the liver. Sections of the kidney showed the most advanced stage of acute parenchymatous metamorphosis. The epithelium was swollen and the protoplasm destroyed and replaced by granular particles and fat droplets, the latter predominating. The points of discoloration upon the intestine appeared to be ecchymotic.

"The cause of death in this case may be ascribed to the toxæmic condition produced by the advanced metamorphic destruction of the hepatic and renal cells."

I have been, and am still of the opinion, that an acute septic peritonitis might have caused all the above changes, though nothing more of an exudation could be discovered on the surface of the peritoneum than is necessary to account for an ad-

hesive inflammation on the separated parts. There have been, however, cases of peritonitis septica under observation where the microscopic changes were either absent or quite insignificant.

From a practical point of view the following considerations may be allowed:

1. Would it eventually be preferable, as recommended and done by others in cases of cholecystotomy, first to establish a fistula of the gall-bladder, operating *en deux temps* in order to be as secure as possible against the infection of the peritoneum? If then after free opening of the gall-bladder the stone cannot be reached, apparently on account of the curved course of the bile ducts, would it eventually be the safest plan to leave it alone and to trust its final spontaneous perforation into the intestine? In our case, as shown by autopsy, this natural process was already inaugurated. In spite of all possible care and precaution it is very difficult, during an operation lasting several hours, to prevent the entrance of infectious material. I need not to say that antiseptic measures were used to my best knowledge in my case.

2. One might, before opening the gall-bladder, search for the stone by palpating along the cystic and common duct. If found near the duodenum, one could try to dislodge it with the intention of pushing it back into the gall-bladder. If one succeeds in doing so, the operative procedure first mentioned might follow.

3. To excise a gall-stone impacted in the common duct *in situ*, seems to me, on account of the deep situation and inaccessibility of the operating field, and the probable impossibility of preventing the contents of the duct from entering the peritoneum, a hopeless way of proceeding. Should it prove to be impossible to push the stone back or to extract it from above, an artificial communication between gall-bladder and intestine, according to Winiwarter's idea, might come into consideration.

If I were to operate a second time under the same conditions as those above described, I should first puncture the gall-bladder, and with a fine needle withdraw as much fluid as possible. I should then try to define the point of obstruction,

and, in a case like mine, push the stone into the apex of the gall-bladder. Then I should close off the peritoneum by sutures around the partly protruding gall-bladder, and after that is achieved, open the latter, extract the stone, and not close the gall-bladder until the spontaneous entrance of bile into the gut had manifested itself.

All these questions can only be settled by experience. I purposely omit quoting those valuable contributions which have lately been offered relative to this subject. My case just recorded, through the location of the stone and the difficulty of getting at it, has some peculiarities of its own, and may form in spite of its unfortunate end, a valuable addition to our present knowledge.

EDITORIAL ARTICLES.

ON LAPAROTOMY IN CASES OF PERFORATION OF THE STOMACH AND INTESTINES.

Whilst the subject of laparotomy in cases of perforations of the intestinal tract is exciting so much discussion and widespread attention among the profession to-day, it will be interesting to note the observations of Prof. J. Mikulicz on this subject, in a paper read by him in the fifty-seventh meeting of naturalists in Magdeburg, and published in Volkman's collection of clinical lectures.¹

Whether a perforation be the result of direct or indirect trauma, of an idiopathic ulcerating process, or caused by the presence of a foreign body obstructing the bowel, the prognosis is generally a bad one, peritonitis soon ending the sufferings of the patient. In rare cases however, the opening in the bowel may be closed by a circumscribed adhesive peritonitis, before any of the bowel contents have escaped. But this has only been observed in cases of very small lesions or when the perforation is the outcome of a slow ulcerating process. To bring about this satisfactory state of things, however, has been, up to the present, the object of our therapeutic measures. Rational as this may appear, the meagre results attained thus far by this mode of treatment, may well cause the thoughtful physician to consider more energetic measures advisable, instead of remaining longer in the position of a quiet spectator, as it were; and to agree in principle with the surgeon who advises in such cases, laparotomy, suturing of the perforated bowel and by a thorough cleansing of the abdominal cavity to endeavor to allay threatening or beginning peritonitis.

Eminent surgeons, such as Nussbaum, Albert, Hueter, Gross, Berger, Zesas, consider this operation indicated in cases of traumatic perforation or rupture. Lloyd, Bouilly and others have performed laparo-

¹ No. 262. (Chirurgie No. 83.)

tomy in such cases, and Kocher and G. Tiling each, by a timely operation, succeeded in saving their patients. Mikulicz, furthermore, recommends laparotomy in cases of non-traumatic perforations, and Kuh and Rydygier advise it also in cases of perforating *ulcus rotundum* of the stomach.

So great has been the progress of surgery during the past ten years, that we no longer look upon opening the peritoneum with fear and doubt, as formerly, and to-day, when no abdominal organ is out of reach of the surgeon's knife, an apprehension of this kind should not restrain us from attempting to remove the primary cause of the trouble.

There are those, however, who oppose operative interference in these cases, such as Beck, who prefers the minimal chances of a spontaneous recovery, assisted by rest, opium, diet, etc. Leyden,¹ on the contrary, in his paper read before the Berlin Society for internal medicine in March, 1884, speaks strongly in favor of operating in cases of perforative peritonitis, and Landau,² Litten and Israel are of the same opinion.

Mikulicz reports 3 cases, operated by himself, during the past few years, a brief review of which will be found interesting.

CASE I. Male, Spanish Jew, æt. 25-30, of cadaverous appearance and in poor physical condition, was brought to clinic (Oct. 7, 1880) in an advanced state of collapse. Had been troubled with indigestion for seven years, and this had suddenly become worse a few hours prior to admission. On examination the abdomen found tense and distended, and painful to touch. Some tympanites. Face pale, extremities cool, pulse 120. Patient vomited frequently, the liquid smelling strongly of alcohol. On puncturing the abdomen, gas with strong odor of alcohol escaped, thus leaving no doubt as to the existence of a perforation in the stomach or intestines. Laparotomy performed that same evening. Incision in the middle line, from umbilicus to symphysis. On opening the peritoneum gas escaped and also a large quantity of dark-brown liquid, in which rice kernels were very plentiful, and which had besides a strong odor of wine. This liquid filled the whole

¹ *Deutsche med. Wochenschrift*, 1884. No. 17.

² *Deutsche med. Wochenschrift*, 1884. No. 16.

abdominal cavity. Intestines of normal appearance. Incision then enlarged up to the ensiform appendix. In the neighborhood of the cardia, on the lesser curvature of the stomach, an opening was discovered, 6 to 8 ctm. in length. The stomach was enormously distended and filled with the above described fluid. After the stomach had been emptied of its contents through the perforation opening, the latter was closed up by nine deep Lembert sutures. The peritoneal cavity was then washed out with a warmed 1% solution of thymol, the intestines, which had been enveloped during this procedure, in warm carbolized cloths, were replaced, and the abdominal wound closed. The operation lasted one hour, and left the patient in a very collapsed state. He did not rally, in spite of stimulants, etc., and died three hours later.

The autopsy revealed, besides slight lesions of the lungs, the existence of a cicatrix in the immediate vicinity of the cardia. No connection between this and the perforation was, however, discovered. Over this latter passed a blood vessel with its branches, some 2 mm. in thickness. That the case was one of rupture of the stomach wall, is evident, no trace of any fresh perforating ulcer being found. The cicatrix in the vicinity may have had some connection with the rent, although nothing was found to warrant this belief, and there is also a possibility that there existed a small cicatricial spot at the place of rupture, which would have easily yielded to the great distension of the stomach. The patient's condition could furthermore have been caused by a blow on the stomach, or by a violent fall on the abdomen; also by the violent attempts of the patient to vomit.

Leube¹ mentions such cases, and H. Chiari described a similar one at a meeting of the Vienna Society of Physicians, Jan. 14, 1881.

The location of the rupture, so high up under the diaphragm, made suturing a very difficult task, but the rent was completely closed, as the autopsy showed.

There can hardly be a doubt but that death would have occurred in this case, in spite of an operation, so great was the state of collapse, before this. The end, however, may have been somewhat hastened thereby.

¹ Ziemssen's Handbuch der spec. Path. und Ther., Krankheiten des Magens.

The author lays considerable stress here on the avoidance in such cases of everything that might tend to induce conditions of collapse, especially the use of too energetic antiseptica.

CASE II. Male, æt. 49. No history of previous severe illness. Bowels always somewhat irregular, however, and for three days previous to admittance there had been no movement. Admitted Dec. 14, 1883, having been seized that same day with sudden great pain in the right inguinal region, which was followed two hours later by vomiting. After this no fæces or flatus had been passed, and the vomiting became more frequent. There was some meteorism present and the abdomen slightly tense. In the cœcal region tenderness and resistance on pressure, also dulness on percussion. No fever. Pulse 108. Oleum ricini and calomel administered but without any effect. On Dec. 17, patient transferred to surgical clinic. Condition about the same. On examination under narcosis a rather large, elongated tumor, reaching from the right inguinal region upward in the direction of the liver, was felt. Excepting some well developed pulmonary emphysema, nothing else abnormal was found. Diagnosis vacillated between perityphlitis and obstruction of the bowel by invagination. Injections of water per rectum were now given and the Faradic battery used, in the hope that this might act favorably on the supposed invaginated intestine. The following day a small quantity of fæces was passed, but otherwise the condition of the patient was unchanged. On the 19th the patient was much worse. Meteorism and pain increased, and the vomiting became more frequent. Operation decided on. Incision in the middle line. On opening the peritoneum about 1 litre of offensive smelling, purulent matter escaped. Intestines largely adherent to each other, intensely hyperæmic and covered with fibrin. The hand, passed into the region of the cœcum could detect nothing, that would cause the supposed intestinal occlusion, etc., so after some adhesions had been divided, the abdominal cavity was cleansed and the wound closed. Operation lasted one and one-half hours. In the night following patient vomited several times and passed a quantity of thin, offensive smelling fæces. The following day he rallied somewhat. There was less meteorism but no cessation of the vomiting, and tenderness of abdomen remained the same. Several movements of bowels. Evening temperature 38.2°.

Pulse 120. No sleep. Dec. 21, patient's condition about the same. Dec. 22, great loss of strength and much dyspnoea. Increase of meteorism. Several stools. Edges of wound found swollen and red. Deep sutures removed. In spite of the frequent use of restoratives, etc., the patient continued to sink, and died on the evening of the 24th, five days after the operation. The autopsy showed, besides the existence of some bronchitis and pleuritic effusion, indications of intense inflammation of the cœcum and lower ileum. The vermiform appendix was twisted and adherent to the cœcum, and was furthermore perforated in several places, its mucous membrane being completely destroyed by ulceration.

In regard to this case the author admits that he considered the state of the patient a hopeless one, when, on opening the peritoneum the existence of purulent exudation was revealed, and that for this reason the cause of the existing symptoms was not sought for when the diagnosis of invagination, etc., had been found incorrect. The somewhat improved condition of the patient the following day, was surprising, and this Mikulicz attributes to the evacuation of the purulent exudation. He is furthermore inclined to believe that, if the perforated vermiform appendix had been excised and the opening in the cœcum closed, the inflammatory symptoms would, in all probability, have subsided and the patient have recovered.

CASE III. Male, æt. 40, always healthy until three days previous to admittance, when he had experienced a sudden, sharp pain in the abdomen, on springing from his bed. Pain increased and vomiting set in. Condition was the same the following day. No movement of the bowels. Symptoms increased in intensity in spite of warm applications, purgatives and injections. When admitted, on April 7, 1884, patient was in good physical condition, with no fever. Pulse 96. Tongue dry and strong fetor ex ore. Abdomen much distended and painful on pressure. On both sides there was dullness on percussion. Otherwise nothing abnormal found. Diagnosis of sero-purulent peritonitis caused probably by intestinal incarceration was made. Forced injection of water, made the following day, had no effect. Opium given internally and warm applications made. Some vomiting. Abdomen more tender and distended. Slight eleva-

tion of temperature, and pulse 100. Laparotomy that evening, seventy-two hours after commencement of illness. Incision in the middle line. On opening the peritoneum 1 litre of offensive smelling purulent matter escaped. The intestines intensely injected and covered in places with fibrinous exudation, and somewhat adherent to each other. On passing the hand into the peritoneal cavity a hard object was felt, about the size of a bean, which proved to be a piece of undigested potato. Several more pieces of potato were also found. It was evident that perforation of the bowel had taken place, and after a short search an opening, 6 mm. long and 4 mm. wide, was discovered in the small intestine on the left side, just above the crest of the ilium. Otherwise nothing abnormal discovered, excepting slight enlargement of the mesenteric glands. The intestine was cleansed, the edges of the rent trimmed off and the opening sutured. The abdomen closed after thorough toilette had been made. No drainage. The next day patient somewhat stronger, but the tenderness over abdomen remained the same. No movement of bowels. No vomiting. Ice and milk administered. Slight elevation of temperature in the evening. Patient vomited once the following day. On the third day after the operation, some fever and much pain in the wound. On removing the dressings the edges of wound were found swollen and red, the cutis having become necrotic in the neighborhood for quite a space. Deep sutures withdrawn, allowing the escape of considerable offensive smelling pus. Large drainage-tube now introduced. That evening less pain. On the fourth day patient passed large quantity of faecal matter per anum. He now made rapid advances toward recovery, his condition being in every way satisfactory. Although it was feared that the loss of substance about the wound would seriously interfere with this satisfactory state of things, it was found that a portion of small intestine had completely closed up the opening, having become adherent to the abdominal walls. Later on silver sutures were used to bring the separated edges nearer together. Patient was enabled to leave the hospital eleven weeks afterwards. Complete closure of the wound, however, took place some two weeks later. Mikulicz, who saw the patient several months afterwards, reports him as having been in good condition, going about his hard daily work with no discomfort whatever.

The author attributes the perforation, in this case, to an ulcerative process, probably a typhous ulcer. According to Strümpell and Weigert such typhous ulcers are usually found in that portion of the intestines where the perforation occurred in the case just described. The enlargement of the mesenteric glands would also help sustain this belief. The sudden development of symptoms of perforation would not necessarily interfere with the correctness of this diagnosis, as there have been enough cases observed, where perforation of the bowel gave rise to the first symptoms of a typhus ambulatorius. In concluding his remarks on this case, Mikulicz calls attention to the fact that although the edges of the rent were incised and sutured, thus reducing the lumen of the intestine considerably, no stenosis of the latter resulted from this.

These three cases cover the whole of the author's personal experience. The result of such operations will necessarily depend to a great extent on their being undertaken as early as possible and before peritonitis has set in. This opinion is also shared by Kocher,¹ Bouilly² and Lloyd³. Mikulicz thinks that the good results attained in Kocher's case, already alluded to, of gun-shot wound of the stomach, would justify the operation. Bouilly, who operated for rupture of the intestine from a kick, altered, by a too brisk interference (digital examination of an already developed fistula), the favorable progress of his patient toward recovery. Acute peritonitis was the result, ending fatally. In Tiling's⁴ case of stab wound of the abdomen with perforation of the stomach, complete toilette of the peritoneal cavity could be but partially effected, owing to the collapsed condition of the patient. No symptoms of peritonitis, however, developed, and recovery took place. We may include here those cases of stab-wounds of the abdomen, where the opening in the latter has been simply enlarged, the perforated organ drawn out and sutured. P. Schmidt⁵ reported a case of this kind, operated by Baudens. Peritonitis resulted in death. The autopsy

¹ Correspondenzblatt für Schweizer Aerzte. 1883. No. 2,324. Beiträge zur Chirurgie des Magens (Centralblatt für Chir. 1884. No. 15.)

² Jahresbericht von Virchow und Hirsch. 1883. II. Bd.

³ British Med. Journal, March 24, 1883.

⁴ St. Petersburger Med. Wochenschrift. 1884. No. 44.

⁵ Lehre von den Operationen am Bauche in Gunther's Operationslehre.

showed the existence of a third perforation, in the cœcum, besides the two which had been found during the operation. Wölfler¹ alludes to a case of perforation of the stomach, operated by a Bavarian physician in 1522. The experiment of Ch. T. Parkes² lead us to believe that more favorable results may be expected in operating for gun-shot wound of the intestines.

Cases of laparotomy in perforations resulting from ulcerous processes, are rare. Litten observed such a case, similar to the third one of the author. The operation was performed by Schroeder. There were symptoms of circumscribed peritonitis in the right iliac fossa, and a sub-cutaneous phlegmon with partial gangrene of the cutis. The intestine was found perforated and the opening closed. Recovery took place in five weeks, a fistula in the lower part of the abdominal wound, however, remaining. Billroth³ operated in a case of perforation of the sigmoid flexure, caused by a foreign-body (paint brush.) The patient, already greatly collapsed before the operation, died the same day. A case described by Chaput⁴ greatly resembles the author's second case. The abdomen was closed after circa 400 grammes of fœcal smelling pus had escaped. Death fifteen minutes later. The autopsy showed that the vermiform appendix was perforated by an intestinal calculus. F. Kaiser⁵ has collected in his very instructive work on this subject, all such cases when operative treatment was undertaken for peritonitis, without regard to the cause of the latter. A study of this work shows that laparotomy, in various forms of perforation of the stomach and intestines, may be followed by good results, even under most unfavorable conditions.

It might be well to consider here the difficulties arising in the performance of this operation. A chief difficulty lies in the impossibility in the larger number of cases of making a correct diagnosis of perforation, at a period when an operation would present good chances for re-

¹ Ueber die von Herrn, Prof. Billroth ausgeführten Resectionen des Carcinomatösen Pylorus. Wien. 1881.

² Gun-shot wounds of the small intestines. Chicago. 1884.

³ R. Wittelshöfer *W. Med. Wochenschrift.* 1884. No. 3, u. f.—Casuistische Beiträge aus Prof. Billroth's chir. klinik., Operat. am Darne.

⁴ Perforation de l'appendice ileo-cœcal par corps étranger.

⁵ *Archiv. für klin. Medicin.*, XV, Baud, S. 74, über die operative Behandlung der Bauchempyeme.

covery. The diagnosis is generally made when peritonitis has already set in and the time favorable to an operation has passed. The question is therefore, whether beginning or already developed peritonitis should contraindicate laparotomy. Although reopening and recleansing of the peritoneal cavity, undertaken to check acute peritonitis after surgical operation in the abdomen, has been so almost universally unsuccessful, yet the results attained in the cases of Bouilly, Israel, Lytten and Oberst¹, also in the author's third case, show that emptying the peritoneal cavity of the exudation, has been followed by recovery. Keith, Spencer Wells and others have demonstrated that ovariectomy has been successful, in spite of existing peritonitis.

The infectious form of peritonitis, resulting from perforation of the stomach or intestines, and which interests us mostly here, may be circumscribed or diffuse in its character, and on this latter would the prognosis of an operative interference largely depend. The chances of the inflammation subsiding are of course more favorable if the causative influence can be removed at the same time. Of great importance also in the prognosis of an operative treatment, is the more or less acute course of the peritonitis. In regard to this Mikulicz distinguishes three forms of perforative peritonitis: the *peracute*, causing death within 24 hours; the *acute*, lasting two to three days, and the *sub-acute*, which develops slowly, and ends fatally in five to fifteen days, sometimes later. Surgical help is only availing in cases of the peracute form, if obtained at once, and a diagnosis be sufficiently well established to justify an operation. Otherwise these cases may be regarded as hopeless. More time for observation may be allowed in the acute and subacute forms, but in all events, laparotomy is best performed as soon as possible. The character and cause of the peritonitis is influenced largely by the type of perforation present, rendering quick interference in the one case necessary, in another allowing longer time for observation. Of traumatic perforations the small ruptures and stab-wounds have certainly a better prognosis than gun-shot wounds, where a temporary closure of the perforation-opening through prolapse of the mucous membrane or adhesion to the opposing peritoneum is hardly to be expected.

¹ Centralblatt f. Chir. 1885. No. 20.

Regarding the stage of the peritonitis in which an operation would appear justifiable, the author points out the desirability of operating as soon as the first indications of peritonitis appear, but he does not think, however, that all hope of saving the patient should be abandoned even when the inflammation has assumed a high degree of development, such cases having recovered, as already mentioned. Neither should a moderate degree of collapse deter us from operating, although we ought to consider well, whether this be due to the final stage of the peritonitis, or simply to nervous depression resulting from the perforation.

The difficulty of making a diagnosis has already been alluded to. Although beginning peritonitis is generally the first indication of perforation, still even this at times fails to enlighten us as to the real condition of things, for instance, in cases of spontaneous perforation. Illustrative of this are two of the author's own cases, described above, and that of Chaput, in all of which intestinal obstruction had been diagnosed, the operation or autopsy first revealing the existence of a perforation in the intestine. And how often is this the case?

Although peritonitis may arise from so many other causes with such similar symptoms, thereby rendering our diagnosis doubtful, we should not even then be deterred from operating, says Mikulicz, for if, according to the opinion of Leyden and others, laparotomy, toilette of the abdomen and drainage is justifiable in cases of spontaneous peritonitis, so much the more would this procedure be indicated in cases where the causative influence of the peritonitis is directly accessible to surgical treatment.

The only partially sure indication of a perforation is, as is known, the presence of gases in the abdominal cavity, and if the presence of these can be proven a short time after the first symptoms appear, a diagnosis will not be difficult. The sharp pain, circumscribed or diffuse, with which perforations are usually accompanied, when they occur suddenly, is also of great diagnostic value, although in itself not always necessarily characteristic of these. In most cases of traumatic perforation the diagnosis can be made with the greatest probability or sureness, before pronounced symptoms of peritonitis will have developed. It is impossible, however, to lay down special rules and maxims in a general way or in regard to the different kinds of perforation. The

field of our experience is as yet too limited. It will be found advisable generally to operate quickly in most cases of gunshot wounds of the abdomen, even when the symptoms of intestinal perforation are not altogether evident. The experiments of Parkes, already alluded to, and the results attained by Kocher and Tiling, show this to be a proper procedure. On the other hand in cases of rupture and contusion it will be well to wait until the first symptoms of shock have subsided, a probable diagnosis being hardly possible before this. Mikulicz also advises that laparotomy be not too long delayed in cases of intraperitoneal injury of the bladder, wherein he agrees with Bartells, Kunz, Maltray, Julliard and Rivington, that the chances of recovery are but slight, if laparotomy and suturing of the bladder be not undertaken very soon, possibly within the first ten hours. Concerning the technique of the operation, the author recommends the incision in the middle line, as being, in the majority of cases, best adapted to a complete survey of the peritoneal cavity. In cases of perforation of the stomach near the fundus, however, the incision may be an oblique or transverse one. He alludes especially to the difficulty, often met with, of finding the perforation, and advises a thorough examination always of the intestine in its whole length. In cases of peritonitis, where no cause is known, the region of the cœcum should be closely scrutinized.

In cases of fresh ruptures and stab-wounds only should the excision of the perforation edges be neglected, before suturing. For the latter Mikulicz recommends silk. In small defects the excision of the edges may be in a longitudinal direction, but in larger wounds a transverse direction will be advisable. In order to avoid bending the intestine too much, it may be necessary to remove a longitudinal rhomboidal portion, the apex of which may reach to the mesenterium. Even a circular resection of a larger or smaller portion should be unhesitatingly undertaken if desirable.

Mikulicz calls attention, furthermore, to the proper and thorough toilette of the peritoneal cavity, and considers that the future of the operation depends greatly on the possibility of success in this direction. Care should be also taken to avoid the use of well-known strong disinfectants, as these are too apt to bring about a dangerous degree of collapse. Of no less importance is the proper drainage of the peritoneal

cavity in such cases where infectious peritonitis exists, especially when accompanied by copious exudation. The author points here to his second and third cases, as showing the error in neglecting this, and cites also a similar case of Bardeleben,¹ recently published. The drain should be at least as large as the small finger, and be carried well up in the vicinity of the perforation. When the peritonitis has assumed a more diffuse character, the introduction of several drains in different directions, would be advisable. Mikulicz recommends uniting the peritoneum by itself, dusting the edges with iodoform, before closing the abdomen.

C. J. COLLES.

RECENT CONTRIBUTIONS TO THE LITERATURE OF
CHOLECYSTOTOMY.

1. Cholecystotomy applied to the treatment of Biliary Calculi. By M. Jules Bœckel (Strasburg). *Revue de Chirurgie*. 1885. P. 801.
2. The Surgical Treatment of Gall Stones. By Lawson Tait, F.R.C.S. *Lancet*. 1885, Vol. II., pp. 239, 424.
3. Cholecystotomy; Notes on two successful cases. By A. W. Mayo Robson, (Leeds). *Lancet*. 1885, Vol. II, p. 806.

1. In this paper the author tries to show that where a biliary fistula exists, the operation for cholecystotomy is both simple and safe, but that where such is not present, the operation is difficult and dangerous. Three cases of operation for biliary fistula are narrated, two successful and one unsuccessful. In the latter, the fatal result is accounted for by the presence of a calculus in the common bile duct near the duodenum, which could not be recognized during life.

Where a biliary fistula exists, and shows no signs of healing spontaneously, B. holds that cholecystotomy, by opening up the fistula, is not only permissible but called for; that early intervention insures and hastens cure by preventing the ill effects of the constant escape of bile from the fistula; and that the operation, easy and safe in itself, is not appreciably less so when the peritoneum has to be opened, provided

¹ Berlin. Klin. Wochenschr. 1885. No. 25.

that antiseptic dressings are used. On the other hand, where no fistula has been formed, he holds that before an operation is undertaken the diagnosis must be made certain by careful observation of the condition and progress of the patient, and especially by the recognition of a distended gall bladder in which calculi have been detected by an exploratory puncture; that even when the diagnosis has been established the operation is only to be undertaken in exceptional (*sic*) cases to avoid the formation of calculi within the hepatic bile ducts, the onset of which cannot be foreseen. When the diagnosis is doubtful B considers that the risk is too great to justify the possible benefit of an operation. Our present knowledge, he believes, does not entitle us to say whether cholecystotomy or cholecystectomy is preferable when an operation is undertaken. In the course of his remarks he does not explain why an opening into the peritoneum, made during an operation for biliary fistula should be comparatively safe, while one for diagnostic purposes, or where there is a distended gall bladder, should be so dangerous as hardly to be undertaken, the dressing in each case being the same: neither does he consider the risk to the patient when a calculus in the cystic duct necessitates the constant flow of bile into the duodenum, the gall bladder being meanwhile distended with mucus, but not yet adherent to the abdominal wall.

2. In their clinical aspect, and probably also, as he believes, in their pathological origin, the author divides gall stones into two classes, (1) the solitary, (2) the numerous. The former are seldom more than two or three in number, and are often of considerable size. Owing to their comparatively large size and rounded shape, they are liable to be caught in the cystic duct and give rise to a series of symptoms which result from the blocking of this duct. These are, pain in the region of the gall-bladder, with its distention by an opalescent fluid secreted by the mucous membrane, loss of appetite, impairment of strength, and emaciation; the bile, prevented from entering the gall-bladder flows constantly into the duodenum so that there is no jaundice. The diagnosis is to be made from the above symptoms, especially the distended gall-bladder. The operation of cholecystotomy is easy up to the evacuation and opening of the gall-bladder, but the removal of the calculus from the duct may be a matter of considerable difficulty—in one case it had to be broken down *in situ* before it could be removed.

In the second class of cases on multiple gall stones—a large number—often several hundred of calculi are present varying in weight from a fraction of a grain to 8, 10 and 12 grains, the majority being between two and three grains. From their irregular shape and comparatively small size these gall stones less frequently remain fixed in the cystic or common bile duct (which is larger), and while passing onwards they generally admit of a flow of bile past them. Accordingly, while attacks of biliary colic are frequent and severe, jaundice is seldom seen except in the earlier attack; bile is generally found in the gall-bladder bathing the calculi, and the distention of the gall-bladder is usually intermittent in a way which is often puzzling. Contrasted with the operation for the solitary kind of calculus, that for the numerous kind differs considerably in its details. In the latter the gall-bladder is not distended. Hence the diagnosis is more uncertain, and when the abdominal section is made, the gall-bladder is not so easily found. Evacuation of the contents is easy, but the subsequent flow of bile requires constant care throughout the operation to prevent contamination of the peritoneum. The majority of the gall stones are easily removed, but great care must be taken that none remain in the neck of the bladder or in the ducts, otherwise the gall-bladder may be afterwards distended with mucus and the wound reopened. In one case a gall stone, lodged in the lower end of the common bile duct, had to be crushed *in situ* from the peritoneal aspect.

The operation of cholecystomy is described as follows: "A vertical incision is made from the margin of the ribs downwards over the hepatic notch, cutting carefully through the textures till the peritoneum is reached; this is then seized carefully with two pairs of forceps and pulled backwards. An opening is made between the forceps to allow the forefinger to enter and feel for the gall-bladder: when found its fundus is to be brought cautiously toward the wound and seized with the forceps, if distended it is then tapped, incised to allow the forefinger to enter, and the cut margins held with forceps; with forceps or scoop the calculi are then removed." A continuous suture is then applied so as to accurately close the peritoneum by uniting the edges of the wound of the gall-bladder, the two peritoneal surfaces being carefully adapted to each other." A drainage tube is inserted for six

or seven days. Tait has found no tendency for gall stones to form after his cases of cholecystotomy and considers that it would be as reasonable to excise the urinary bladder to prevent reformation of stone there as to perform cholecystectomy as a preventative against gall stones. "At any rate, the mortality of cholecystectomy is 50 per cent.: the mortality of cholecystotomy has not yet appeared." In conclusion, he says: "Amongst all the many advances which abdominal surgery has seen, I claim that there is none so certain nor so free from risk, nor so brilliantly successful as the surgical treatment of gall stones."

3. The symptoms in both these cases were due to obstruction of the cystic duct, but contrary to Mr. Lawson Tait's experience by numerous, not solitary, calculi. The symptoms, besides the distended gall-bladder, were local, dragging pain and uneasiness in the one case, and vomiting and prolonged constipation in the other. In one there was nearly a pint of clear watery fluid, in the other eight ounces of a similar fluid, in the gall-bladder. Jaundice seems to have been absent in both. After the operation an obstruction of the cystic duct was diagnosed from the re-accumulation of the watery fluid. This from absence of other cause was thought to be due to an organic stricture of the cystic duct. The fluid contained in the gall-bladder was found to possess antiseptic properties, also to contain two ferments, one curdling milk, and the other having a marked diastatic action on starch.

CHARLES W. CATHCART.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL SCIENCE
IN ITS SURGICAL RELATIONS.

(Continued from Page 333.)

PYÆMIA—ERYSIPELAS.

Pyæmia.—According to the latest investigators of pyæmic affections it appears, as if from a strictly bacteriological point of view there were no distinction to be made between sepsis and pyæmia. Rosenbach¹, who examined six cases of typical pyæmia with a view to determining the nature of the micro-organisms present in pyæmic subjects, found the *streptococcus pyogenes* present in five of the cases, partly in the blood, partly in the metastases. Twice *staphylococci* were present as well, although in fewer numbers; and once he found only *pyogenic staphylococci* alone, and that in a very typical case of pyæmia.

Comparing these results with the cultures obtained from septic diseases, including phlegmons, abscesses and progressive tissue-gangrene, he was able to trace no difference whatever between the two diseases, as far as micro-organisms are concerned.

In observations preceding this publication, however, there is no lack of assertions, that bacilli are to be found in the blood and organs of pyæmic subjects, and this was once a very favorite theory.

Betzow², who examined some cases of pyæmia post-mortem found cocci, bacilli and leptothrix present. But since his methods did not include culture-experiments, and his observations were not made till fifteen or twenty hours after death, his deductions need corroboration.

It is not improbable, however, that other pyogenic micro-organisms will become better known in the future, and since pyogenic bacilli have already been described and figured, it is quite possible that some of these species may also be proved to be a cause of pyæmia in man. At present, however, we have not even an analogy to such a disease

¹ Microorg, bei den Wundinf. Krankh. des Mensch, Wiesbaden. 1884.

² Centralblatt für medic. Wissensch. No. 22. 1884.

in animals, the typical cases of pyæmia in rabbits described by Koch¹ being due to a micro-coccus.

It is of importance to note, also, that Schüller², who examined the metastases in twelve cases of puerperal fever, found only *strepto-cocci* and *single* and *diplo-cocci*, but never bacilli, in the inflamed joints.

The question why the same micro-cocci produce pyæmia, that is to say localized metastases, at one time, and at another, sepsis or non-localized general intoxication alone, cannot be satisfactorily treated with our present knowledge of the subject.

Erysipelas.—Before Fehleisen's celebrated work appeared the ætiology of erysipelas was problematical and obscure.

Micrococci had been frequently found in erysipelatous affections, but since experiments had been published to prove that inoculations with erysipelatous matter containing micrococci, did not always produce erysipelas, even in the same animal species, and again, that erysipelas could often be communicated although no micrococci were present, as, for instance, by the contents of the erysipelatous bullæ, no definite knowledge was arrived at. Max. Wolff³ concluded from a review of the subject and a number of original observations, that certain micrococci produced some chemical poison which occasioned erysipelas. The distinction, moreover, between erysipelas and phlegmonous processes was formerly not accurately made, and Tillmanns⁴ even believed that erysipelas germs could produce septic diseases.

And yet Orth⁵, as long ago as 1874, had cultivated erysipelatous bacteria in nutrient solutions and had successfully inoculated them from thence. Had his methods possessed all the advantages of those of the present day, his experiments would have had more importance attached to them.

Koch described the specific organisms of erysipelas as small micrococci of globular shape, united in pairs or forming short chains, and

¹ Untersuch. üb. d. Aetiol. der Wundinfections Krankh. Leipzig. 1878.

² Ueber Bacterien bei metastat. Gelenkentzündn, Verahndlg. d. Deutsch. Ges. f. Chirurg. 13. Congress. April, 1884. Berlin.

³ Bacterienlehre bei accidentellen Wund-Krankheiten. Virchow's Archiv. Vol. 81. P. 408.

⁴ Archiv. für klin. Chirurg. Vol. 23. P. 437.

⁵ Archiv. für experiment. Patholog and Pharm. Vol. I, p. 81.

published photographic representations of them, both in the first volume of the Communications of the Imperial Board of Health and in his work on the infectious diseases of wounds, where he also historically refers to former researches.

Fehleisen, however, was the first to cultivate the micrococci in pure cultures on hard soils¹, and to inoculate human subjects with these cultures. Examining thirteen cases of erysipelas (two of which subsequently died), and excising pieces of skin from eleven of these, this author always obtained the same results and found chains of micrococci in the lymphatics of the cutis and of the areolar and fatty tissue beneath, and especially in those of the superficial layer of the corium.

The micrococci were not to be found in the capillaries or blood-vessels; nor were they present in cases of lymphangitis. They were most frequent in the parts most recently affected; while the bullæ contained in their serum great numbers of other micrococci and bacilli, but no specific erysipelas-cocci, or only such as had lost their vitality.

The culture-experiments were made upon gelatinised infusion of meat, and were continued to the fourteenth generation in a space of two months. These cultures were subsequently repeated and approved by Koch himself and Gaffky.

Inoculations made at the tip of the ear in rabbits produced erysipelatous inflammation which subsequently spread to the root of the ear, with all the specific accompanying symptoms. The inoculations of human subjects were performed as a therapeutic measure; such a procedure being deemed justifiable in consideration of Busch's results, who had achieved a complete cure of malignant lymphatic tumors by means of placing the patient in a bed which was known by experience to convey erysipelatous infection to the occupant.

Consequently six inoperable cases of tumor were chosen on which to try the experiment, which proved not unsuccessful.

The first case was one of multiple fibro-sarcoma. Inoculation with the pure culture matter produced typical erysipelas, commencing with a rigor and lasting for two weeks. A collapsed condition of the patient

¹ Die Ätiologie des Erysipelas. Berlin. 1883. Th. Fischer. In its first part this book contains a full historical account of the views formerly current on the nature of erysipelas, and review of the bacterial data and theories.

on the sixth day, however, had the effect of demonstrating the danger of the proceeding. In this case the cure was incomplete.

The second case, however, one of recurrent carcinoma of the mammary gland, that had been twice operated upon, proved more successful. Here, too, the infection with the pure cultures was followed by a rigor; the bodily temperature rose to 40.5°C ., and the inflammation extended over the whole chest and abdomen. After two weeks the process had subsided, but pleuritis had set in as a complication of the disease. The hard carcinomatous growths had *entirely disappeared*.

In other cases, a recurrent sarcoma of the orbita in an eight-year old girl, and two inoperable cases of mammary carcinoma, the inoculation produced no marked improvement; but one case of facial lupus, on the other hand, was completely cured. In all cases the disease ran a typical course; the time of incubation varied from fifteen to sixty-one hours. A period of immunity of short duration also appeared to exist. One man who had had an attack of erysipelas a few months before, was inoculated twice without result. And in the case mentioned of the girl suffering from orbital sarcoma a second inoculation after lapse of two weeks "did not take." The patient with lupus of the face, on the other hand, had had erysipelas nine months before.

These results, as Koch points out in his review of the book¹, prove beyond doubt the parasitic nature of the erysipelas-micrococci, which was not previously understood.

Fehleisen also experimented with antiseptic solutions upon his erysipelas-cultures, and found that a three per cent solution of carbolic acid had no effect upon the micrococci for twenty seconds; after thirty seconds inhibitory action was noticed, and after 40 seconds their vitality was destroyed. One pro mille sublimate solution killed them in ten or fifteen seconds.

Fehleisen demonstrated the micrococci and their effects at the Surgical Congress at Berlin in April, 1883.

In regard to the therapeutic employment of erysipelas-cultures, a publication of Dr. Janicke and Prof. Neisser, of Breslau,² should here be

¹ Fortschritte der Medicin. Vol. I. P. 168.

² Exitus letalis nach Erysipelimpfung bei inop. Mamma-carc. und microsc. Befund des geimpften. carc. von Dr. O. Janicke und Prof. A. Neisser, in Breslau. Centrbl. f. Chir. 1884. P. 401.

mentioned, where description is given of a patient suffering from inoperable carcinoma of the breast, who was treated by inoculation with the specific micrococci in hopes of producing a cure, but who died from the effects of the infection. The autopsy revealed destruction of the proper cells of the growth without suppuration. The material for inoculation was procured from Fehleisen's laboratory. The disease commenced with a rigor, followed by a rise of temperature over 40°C . The rash extended over the whole chest, the shoulder and axilla, with temperatures up to 41°C on the first day. Subsequently it spread over the whole abdomen, the whole arm and half of the arm of the opposite side. Death occurred in collapse on the fourth day, the temperature not having gone below 40.4°C , and the pulse remaining between 120 and 140. Before death occurred the tumor had visibly decreased in size and the swollen lymphatic glands had become much smaller and softer. A detailed microscopical post-mortem examination is appended by Prof. Neisser.

The present writer also had the opportunity of observing a case of inoperable recurrent sarcoma of the neck in an adult which was treated by erysipelatus inoculation by Geh. Rath Thiersch, of Leipsic, but without curative effect.

Fehleisen's specific micrococcus of erysipelas is in character a streptococcus. Now, as we have described a pyogenic or pus-forming streptococcus found by Rosenbach and Passet in pus of osteomyelitic and phlegmonous origin,¹ it becomes necessary to distinguish between the two kinds. Hoffa, of Prof. Maas' surgical clinic at Würzburg has recently pointed out some points of differentiation between the two².

The two species of micrococci cannot be distinguished with the microscope alone. Both kinds form chains of two or more cocci, varying in size from 0.3 to $0.6\ \mu$; the chains being either straight or curved or S-shaped. In gelatine soils kept at a temperature of 24°C , a delicate transparent greyish-white halo appears around the inoculation puncture upon the surface during the first day, while light grey minute specks and dots are to be seen in the course of the puncture. The halo undergoes no subsequent change, but the light points materially increase in size during the next twenty-four hours.

¹ This volume. Pages 224 and 332.

² Fortschritte des Medicin. Vol. IV. P. 75. Feb.

But in plate-cultures on agar-agar soils, kept at a temperature of 37° C, in which the first phases of development exactly correspond to the above description, a difference manifests itself after forty-eight hours. The colonies of the specific cocci of erysipelas develop considerably faster than those of the pyogenic cocci. The latter soon present the light brown color in the raised centre and the ridge around the edge; but the former show neither of these criteria. According to Rosenbach the later stages of plate-cultures of the erysipelas-cocci resemble fern leaves in shape, those of the pyogenic-cocci those of the acacia tree; but Hoffa believes these differences only due to variations in the state of humidity of the soils.

The question whether abscesses and suppuration of neighboring joints in cases of erysipelas are produced by the specific micrococcus of erysipelas or by the pyogenic micrococcus is rendered very difficult of decision by the similarity of the two varieties. Schüller,¹ who found micrococci resembling Fehleisen's cocci in metastatic suppuration of the knee-joint in a case of erysipelas, did not apply the culture tests.

Hoffa, however, was able to demonstrate the presence of Fehleisen's specific micro-coccus in a purulent gonitis occurring in a case of erysipelas migrans² beyond a doubt, and accounts for the infection by the anatomical relation which exists between the lymphatics and the joints.

But whether or not Fehleisen's specific micrococcus can produce suppuration, which Klemperer³ denies, is a question to be definitely solved in the future.

W. W. VAN ARSDALE.

¹ Report of the German Surgical Society. 13th Congress. Berlin. April, 1884.

² L. C. P. 78.

³ Ueber die Beziehung der micro-organismen zur Eiterung. Zeitschrift. f. Klin. Med. Vol. X. P. 158.

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. Contusion and Inflammation as Causes of Local Predisposition to the Development of Secondary Cancer. By Dr. NICAISE (Paris). After a résumé of the various theories of the formation of primary cancer, giving special prominence to the embryonic theory of Cohnheim, he arrives at secondary cancer and cites two cases in support of his theory regarding the development of such a growth at one point rather than at another, which is embodied in the title of the paper. 1. A case of cancer of the uterus with umbilical hernia and secondary cancer of the involved omentum, in a woman, *æt.* 56, in good general health, notwithstanding a strumous childhood. Had suffered from amenorrhœa and metrorrhagia. Nine years previously an omental hernia had appeared and gradually enlarged to the size of a goose egg and was well supported by an umbilical belt. A month ago the patient discovered in place of the hernia, a tumor of the same size, perfectly movable but extremely hard and irreducible and adherent to the umbilical skin; shortly after, nausea and recurring vomiting, never fecal, supervened and there was some abdominal pain. On examination, the cervix uteri was found to have disappeared and been replaced by an infundibuliform passage leading to the uterine cavity, with ulcerated and lacerated walls. She continued to grow worse and died thirteen days later, of peritonitis, precipitated by perforation of the uterine wall. The autopsy showed cancerous degeneration of the uterus, in which also were involved the uterine appendages, the right ureter and a portion of the great omentum, which was extruded in the hernia. The extension of the cancerous trouble to the omentum is to be explained by the fact that the hernial part, modified by the friction of the bandage and the consequent irritation, had become pathological

ground, a *locus minoris resistentiæ*, where the agents of the generalization of the cancer had stopped and induced the development of a secondary cancer, leaving untouched the intra-abdominal portion of the omentum, forming a typical example of the influence of repeated irritation on the localization of secondary cancer. 2. A case of cancerous tumors in the epigastric and umbilical regions with concomitant cancer of the pylorus in a man, æt. 58. The umbilical tumor was about the size of a large egg and situated a little to the left of the umbilicus, while the one in the epigastrium was larger and flattened like a cake. The latter, formed by a mass of omentum protruding through an opening in the aponeurosis of the right rectus, was removed by operation easily and with little hæmorrhage, and proved to be an undoubted scirrhus. The patient rapidly grew worse and died on the third day in collapse and from no appreciable cause. On autopsy, the umbilical tumor was found to be formed in the same way; the pylorus was also found to be affected and, as the patient's grandfather had died at about the same age of a stomach affection, it was probably hereditary and the primary trouble of which the others were extensions.—*Revue de Chirurgie*. 1885. Sept.

P. K. ABRAHAM (London).

II. On Discolorations of the Skin Occurring after Extravasation of Blood. By K. ESCHWEILER (Erlangen). The author for the first time approaches the questions referring to the discoloration of the skin after hæmorrhages by means of experimental and microscopical investigations, most authors having dealt only theoretically with the subject.

He examined twelve pieces of discolored human skin, representing different stages of transformation and different colors. Transparency of the skin was tested by injections of carmin, fuchsin and indigo beneath the cutis, and also of arterial and venous blood of rabbits under human skin; Pieces of excised skin were, moreover, superimposed upon bits of colored paper, and solutions of hæmoglobin were used to imitate hæmorrhagic conditions. Several experiments were furthermore performed upon the conjunctiva of rabbits in order to ascertain why hæmorrhages here always appear red and never bluish.

By this means the author found that Gussenbauer's and other authors' theories were in great part untenable. The following is a résumé of his conclusions.

1. Injuries to the deeper-seated parts of tissues are almost always combined with cutaneous hæmorrhages.

2. The red blood-corpuscles which enter the tissues frequently preserve their properties for a long time. Those of venous or of diluted blood disintegrate more rapidly than those of arterial blood.

3. The coloring-matter of the blood is set free, partly immediately after the occurrence of the hæmorrhage by means of the destruction of the red blood-corpuscles, partly more gradually by the process of solution. Pigment particles may be formed at once out of the coloring-matter of the broken down blood-corpuscles; but by far the greater part of the coloring-matter is dissolved and diffused through the tissues, there to be subsequently condensed into granular pigment.

4. The pigment normally to be found in the rete Malpighi is increased in quantity some time after hæmorrhages have occurred in the skin, or even in deep-seated parts, without affecting the skin.

5. Discoloration of the skin after hæmorrhages is caused partly by the blood-corpuscles imbedded in the tissues, partly by the coloring-matter of the blood either in solution or in the shape of granular pigment—but only if the color-substance approaches to within one or one-and-a-half millimetre of the surface. In most cases discoloration is caused by the pigment and coloring-matter, and not by the blood corpuscles.

6. The tint and shade of the discoloration has nothing to do with alterations of the coloring matter of the blood, but depends solely upon the following four conditions:

- (a.) Proximity to the surface; the more superficial the layer is, the more the color will approach to yellow and red lines; more deep-seated coloring produces bluish tints.

- (b.) Density of the layer of coloring matter; thinly dispersed layers produce yellow and red lines, more solid ones red and blue. On this account arterial blood occasions a redder coloring than venous blood, and blood diluted with lymph the same. A yellow tint is only produced by diffused slight coloring in the most superficial parts of the skin.

(c.) Extent of the layer of coloring matter in thickness ; narrow layers color more red, thick ones more blue.

(d.) Arterial or venous state of the blood ; red lines may be caused by the former and bluish ones by the latter condition of the extravasated blood, but only, it appears, to a limited extent, and only if the hæmorrhage is situated one or one-and-a-half millimetre from the surface of the skin, and if the breadth of the layer is sufficiently great.

7. The same laws which apply to the skin hold good in regard to the conjunctiva as well, all peculiarities pertaining to the latter being occasioned only by special structural conditions.—*Deutsch. Zeitschr. f. Chir.* Bd. 23. H. 1 and 2. Dec. 1885.

W. W. VAN ARSDALE (New York).

III. On the Treatment of Erysipelas. By Dr. G. KUEHNAST (Freiburg.) The acceptance of the view that erysipelas is an infectious disease brings with it the demand for suitable antiseptic treatment. Hueter's plan of local hypodermic injections of phenol does not give very satisfactory results, not only from its imperfect destruction of the germs but from its failing to effect drainage.

Kraske (1880) reported excellent results in phlegmonous septic processes from multiple incisions and scarification. It seems that Dobson had employed scarification in erysipelas as long ago as 1828. Two of Kraske's later cases successfully treated by the above method are mentioned. His assistant here describes its further application in these cases of erysipelas. He makes fifteen to twenty incisions to the square inch, some punctiform others up to one ctm. long. Most of these only penetrate the superficial layer of the corium, but about one to the square ctm. passes through the entire cutis. These are made all over the erysipelatous tract but of course thickest along and just beyond its edge. At first a bloody-serous fluid exudes, later abundant pure blood. Then the skin is raised in folds and, under a current of five per cent carbolic, as much fluid is squeezed from the tissues as possible, the carbolic being finally rubbed in with the flat of the hand.

His cases are : 1. Erysipelas of leg and thigh, starting from an ulcer cruris. By the next morning all symptoms of the trouble had disappeared.

2. Erysipelas of arm, from a burn. Likewise disappearance of the symptoms by the next day.

3. Erysipelas starting from a nearly healed rectal abscess. Next morning the trouble seemed to have been aborted, but it soon reappeared a little to one side. Scarifications afresh—without carbolic treatment, owing to the effect of the first on the urine. Dry sublimate dressing. Again temporary improvement and relapse. This time it involved the scrotum which naturally could not be subjected to this procedure. On its progressing to the thigh, however, the treatment was renewed—this time with lasting effect.

In each of these cases the temperature rose directly after the operation, then sank to the normal in a few hours. In light cases, and where exposed portions of the body are attacked, this method is of course not advisable. In children, old and infirm patients, care must be had as to the antiseptic chosen.

[If it is desired to employ local antiseptics in erysipelas a much simpler, more widely applicable and very satisfactory method is available. Burman (*Practitioner*, May 1884), reported some very favorable experience with the local use of iodoform collodium. Dr. Lyttle of New York (vide report in *Bost. M. and S. Jrnl.*, 1885, Jan. 1, p. 14), also speaks well of the same. We can corroborate this. Especially instructive was a case of erysipelas from a slight wound in the thigh. Wherever the coating was continued well over the neighboring apparently free skin, the process was checked; where this had not been done, the process extended, but was stopped by a fresh properly extensive coating. This application, moreover, alleviates the burning and discomfort immediately.—W. B.] *Centbl. f. Chirg.* 1886. No. 9.

NERVOUS AND VASCULAR SYSTEMS.

I. Ligature of the Common Femoral Vein. By A. SCHÖBER. Two cases operated by Maas in 1884 are here reported:

1. A man æt. 76. Cancer of left leg, with walnut-sized inguinal glands. Extirpation of the tumor and also the glands, with a ligature of the great saphenous vein close to crural vein. For about three weeks it progressed well. Then a remaining infected gland was found in the groin and a quarter-sized ulcerating cancrroid at the back

of the calf. Extirpation of both. In removing the gland it was found adherent to the femoral vein and the latter was slightly wounded. A ligature was applied below, as also to the vena profunda and some smaller veins. A very atheromatous inguinal artery was also tied. After the operation, lasting an hour, the leg became cold and dark blue. All the cutaneous veins were distended. The radial pulse was fair, but none could be felt in the posterior tibial artery. The leg was elevated to an angle of 45 to 50° , and stimulants given. The cyanosis of the leg disappeared in two hours, though the limb was still cold. By 3 o'clock the thigh was warmer again, although the surface thermometer on the leg showed but 33° , and at 4:30 o'clock 34.6° over the knee. By 10 o'clock even the toes were quite warm. A slight dark, rosy hue appeared on the thigh about 9, extended to the leg by 11 o'clock. A slightly œdematous condition of the skin gave it a glossy appearance; this did not pit, but simply paled on pressure. The same local conditions persisted next day. On lowering the leg, it with the left part of scrotum became moderately œdematous. On raising the extremity again this disappeared, and the limb presently took on a normal appearance. The first twelve days everything went well, except an inexplicable transitory rise of temperature. Then fever set in without any obvious cause. Rusty sputum, etc. The temperature returned again to the normal, but he died about three weeks after the operation. The autopsy showed a perfectly aseptic condition of the wound. Good thrombi. Pelvic veins about left sciatic nerve apparently wider than about right. Pulmonary hypostasis on the right. A walnut-sized metastatic cancer in the left lung.

2. Man, æt. 39. Carcinoma penis. Amputation of same with co-removal of enlarged inguinal glands on both sides. The common femoral vein was injured on the left and tied, as also several smaller veins. The leg soon became cyanotic. On removing the right inguinal glands the corresponding femoral and large saphenous veins had also to be tied. This leg too soon became cyanotic. Symptoms of shock followed the operation, but presently subsided. No œdema developed. On the evening of the third day the temperature rose. On fourth day some œdema of right leg; on fifth day, dark circumscribed

suffusion without oedema on dorsum of right foot—slight oedema on the left; gradual collapse and death same evening. Autopsy showed: Yellow atrophy of heart, verrucous endocarditis of mitral valve, emphysema and oedema of lungs, fatty liver, parenchymatous nephritis, diphtheritic ulceration of bladder, thrombosis of large saphenous veins on both sides. No unusual discoloration or changes on legs. On injecting colored fluid into a branch of the large saphenous vein in front of the internal malleolus a not very high (*nicht allzuhoher*) pressure sufficed to make it flow from the inferior vena cava.

S. adds his cases to those favoring the view of Braun, that coligation of the artery is not required or advisable [*vide* Dr. Pilcher's article in the ANNALS for February, 1886.] *Würzburg Dissertation*, 1885.

W. BROWNING (Brooklyn).

HEAD AND NECK.

I. On Tuberculous Ostitis of the Flat Bones of the Cranium. By Dr. J. ISRAEL (Berlin). At a meeting of the Berlin Medical Society, January 27, 1886, the author exhibited a remarkable case of tuberculous ostitis and caries. The patient had been under his care for over seven years, during which time he had been subjected to some thirty-seven operations, before a cure was effected. Patient, a boy, æt. 6, strong and healthy, first applied for treatment in November, 1878, for what was apparently a slight scalp wound, sustained by a fall. Discharged in a week's time, he was not seen again for three months, when he returned. The wound had not healed and the general condition of the patient was poor. An examination now showed that the injury had been a fracture of the skull in the temporal region, with depression and overlapping of the edges of the fractured bone. A probe could be passed through a fistula at the point of fracture, down between the dura and cranium into some granulation-tissue. Notwithstanding this the boy was at first comparatively comfortable, but the development soon afterwards of three circumscribed small tumors on the right side of the cranium, was accompanied by some febrile movement. Two of these swellings were situated on the right parietal and one on the frontal bone. On being incised considerable pus escaped

and the bone was found denuded. General condition of the patient became worse, symptoms of pressure on the brain following, showing that the cranial cavity had been invaded. The bone having been found diseased at the three places mentioned, it was entirely removed at the two affected spots on the parietal and partially only at that on the frontal bone. Between cranium and dura was a yellow, cheesy mass and some granulation-tissue on which lay a sequestrum of the tabula vitrea, all of which was removed and the dura cleansed. On dividing the skin at the point of fracture in the temporal region, the fistula was found leading down between dura and cranium. No tuberculous deposit was seen here, only a rather extensive formation of granulation-tissue, which was also removed. Whilst these incisions were healing up, two new swellings, one on the right parietal and one on the left frontal bone, appeared. These, however, disappeared spontaneously, leaving deep cicatricial depressions in the bone. There developed then a tuberculous deposit at the base of the skull, the abscess breaking through, spontaneously, outwardly, leaving a fistula between the auricle and temporal bone. A sound could be passed through this to the base of the skull, where the bone was found denuded and carious about the styloid process, and the scoop was therefore also applied here. Wounds healed rapidly, new bony formation taking place where the skull had been trepanned. Although the cranium was not again attacked, the boy had yet much to undergo during the following six years. One after another the bones of the right foot became carious and were resected, until of all the tarsal bones only a small portion of the calcaneus remained, on which the Achilles tendon is inserted. Cicatricial-tissue filled in rapidly, taking the place of the osseous structure, so that the patient retained a useful foot, made very serviceable by the help of a properly constructed shoe. The left second rib was next attacked and a cold abscess forming, rendered a resection necessary, which was followed by a rapid recovery. The same destructive process having developed in the bones of the left foot, amputation of the lower leg had to be performed, after nearly four years, during which eleven larger operations to preserve this member had been undergone by the patient. This was in September, 1885, and since then the boy has enjoyed good health, and is able to use his lower limbs now without any trouble or

help. There has never been any symptom that the tuberculous process had affected any of the inner organs of the patient, whose general appearance is in every respect a satisfactory one.

Tuberculosis of the cranial bones is rarely seen. The author has observed only four cases, three of which, however, had besides, tuberculous affections of other bones, of the lymphatic glands, etc., so that caries of the cranial bones here only formed a part of a wide-spread process of disease. These three cases were of young boys, all under 10 years of age. The fourth case was that of a man, æt. 22, in whom the cranium alone was diseased, the seat of the affection being the base of the skull, outwardly and posteriorly to the large foramen.

The parietal and frontal bones would appear to be more usually affected than the other flat cranial bones. Volkmann's appellation of "perforating tuberculosis of the cranial bones" is not always a correct one, as in the author's case, described above, where the cranium was not perforated in three of the five affected spots.

The difficulties in making a differential diagnosis between these affections and gummous tumors of the skull, are oftentimes great, as in such cases where the tuberculous process leads to the formation of an elastic granulation swelling without free fluid contents. In such cases it would be impossible to distinguish between the two, without taking other facts into consideration.

In regard to the pathogenesis of the above described case, the author is of the opinion that the tuberculous process, attacking the flat cranial bones, parts so little disposed to this affection, in a boy, up to that time healthy and without any hereditary predisposition to tuberculosis, was probably induced by the trauma. The fact, that five of the six diseased points were on that side of the cranium, where the fracture was situated, or in the immediate vicinity of the same, and that the disease attacked bones in other parts of the body four months after those of the cranium, would seem, to some degree, to justify him in this belief. There is also considerable probability, he thinks, that the wound, so much neglected at first, may have formed the point of entrance for the virus.—*Deutsch. Med. Wochenschrift*. No. 6. Feb. 11. 1886.

C. J. COLLES (New York).

II. Successful Extirpation of an Intra-Cranial Tumor.

By SIG. DURANTE. At the November meeting of *La Reale Accademia Medica di Roma*, Durante exhibited a patient from whom he had removed an intra-cranial tumor, this being the second case operated on in the history of surgery, and the first successful case on record.

Chiara Battistelli, æt. 35. Patient was of a good constitution and well nourished. The left eye projected from the orbit and was turned outward, but the movements and sign were not impaired. The change in the external appearance of the eye began three months before, but this had been preceded by the following symptoms: Gradual loss of sense of smell, loss of memory, especially memory of names; uncertainty of movements, and a feeling of emptiness in the head. Motion and sensation were unchanged. The character of the patient had undergone a change. Formerly she had been of a lively, happy temperament, but she had become morose, melancholy, and was constantly brooding over her health. Hearing, taste, and the digestive functions were unchanged.

From these symptoms, Durante diagnosed the existence of an intra-cranial tumor pressing upon the olfactory nerves, the anterior lobes of the brain, and penetrating the orbital cavity through its roof. He proposed an operation for the removal of the tumor, and the consent of the patient was obtained.

The operation was performed June 1, 1885. An incision was made, running from internal angle of lids of left eye upward and toward the left to the hair. The flap of skin being turned down, with hammer and chisel a portion of the frontal bone, about five centimeters (two inches) square, was carefully removed from over the orbit. On removing the internal table, the tumor was exposed and carefully drawn out, when it was found that the pedicle was attached to the dura mater of the left lobe. A prolongation of the tumor had descended into the ethmoid cells. It had also depressed the roof of the orbit without penetrating it, and had compressed the left anterior lobe of the cerebrum. The tumor was a sarcoma about the size of an apple.

Hemostatics were employed, a drainage-tube inserted, and the skin flap replaced. The operation lasted about an hour, under chloroform.

There was not much hæmorrhage, and the patient awoke after the operation with her speech somewhat impaired. In three days a copious discharge of bloody pus flowed through the draining tube. On the fourth day the patient became very weak, felt sleepy, and experienced great confusion of mind. The wound was syringed out with anti-septics, and the patient again improved. On the seventh day the sutures were removed, on the ninth the drainage-tube was withdrawn, and on the fifteenth day the patient went home well, although the sense of smell and memory had not greatly improved. There were no indications of a reproduction of the bone removed, but the eye had resumed its normal appearance.

Durante saw his patient three months afterward. Her mental and moral faculties had been entirely restored, and the sense of smell had gradually returned. The sense of smell was found only on one side, the left olfactory having been destroyed.—*Bull. della Reale Accad. Med.*, and *Buff. Med. and Surg. Jour.*

F. R. CAMPBELL

III. On Emphysema of the Orbita. By PAUL MARCUS. (Schwerin.) The author first gives a case and then proceeds to discuss the entire subject of orbital emphysema.

A physician was hit by a pistol bullet on the lower edge of the zygomatic arch near the temporal portion, and part of the bullet perforated into the orbita passing through the antrum Highmori. Soon after, the patient had occasion to blow his nose, and with this action the eye-ball protruded far out of its socket, causing great pain. The second branch of the fifth nerve was not injured, but the optic nerve was severed, causing blindness. In the course of six or eight days the exophthalmus disappeared, and after six weeks the patient had quite recovered, the bullet remaining in situ. The protrusion of the eye-ball was caused by air being forced into the cellular tissue of the orbita from the maxillary sinus.

After considering the various means by which injuries leading to orbital emphysema may be brought about, the author reviews the cases hitherto published relating to the subject. These comprise two cases of traumatic communication of the orbita with the antrum of Highmore,

one of fracture of the frontal sinus, six of fractures of the ethmoid bone, and two of fracture of the lachrymal bone, besides one of rupture of the lachrymal sac. In contradistinction to these traumatic cases he adduces only one of "pathological" emphysema of the orbita, brought about by forcible extirpation.

The symptoms of orbital emphysema consist in the sudden development during forced expiratory movements, as sneezing, or greater protrusion during expiration with closed nostrils. Compression of the lachrymal cyst sometimes increases the protrusion.

Emphysema disappears more quickly (in three or four days) by absorption than do effusions of blood (three or four weeks.) The eye is impeded in its movements and the images frequently appear doubled. Emphysema of the eyelids may render diagnosis difficult. Pain is not always present.

The disorder generally terminates in recovery in a few days, but may recur at intervals for a long time, (as in one case whenever vocal exercise was attempted.) If great pressure is brought to bear upon the air, the emphysema may extend through the orbital septum or tarso-orbital fascia at the internal canthus into the eyelids, but not further to the cellular tissue of the skin of the face.

The author also performed some experiments upon rabbits to elucidate the subject, and was much surprised to find that injection of about twenty cubic centimetres of air through the conjunctiva close to the bulb not only produced bilateral exophthalmus, but rapid death from asphyxia in one minute. This symptom was explained by entrance of air into the circulatory system; rupture of the ophthalmic vein being produced by the protrusion of the eyeball, the air entered into the veins of the body. This event is not to be feared in the human subject, on account of the slight pressure acting upon the air; nor is there any danger of air entering into the cranial cavity.

By injecting colored matter into the spaces distended by air, the author found that these spaces were not distributed through the cellular tissue, but that all the air remained collected in one mass behind the fatty tissue enveloping the eye; he therefore proposes to term the disease "pneumo-orbita" instead of emphysema.

The prognosis is favorable; the treatment recommended consists in

light bandaging, with application of elastic collodion in case of emphysematous eyelids. An instrument adapted for compression may be worn in chronic cases. In cases of very considerable emphysema tapping may be resorted to and repeatedly performed.—*Deutsch. Zeitschr. f. Chir.* Bd. 23. Hft. 1 and 2. Dec., 1885.

W. W. VAN ARSDALE (New York.)

IV. A New Method of Treating Cleft Palate. By GEORGE ARTHUR, M.D., (New York). This method is adapted only to those cases in which the cleft involves the hard palate. The two halves of uvula and soft palate should first be united as completely as possible by freshening their edges and securing them with sutures, preferably the perforated shot suture; if the cleft is too wide for this to be done without undue tension of the parts, small portions of the posterior and internal border of the free edges of the palatine processes—large enough only to secure support for a silver wire to be passed through perforations drilled through their centres for that purpose—may be cut off with a fine sharp chisel under the mucous membrane, which should be completely separated from their inferior surfaces with the periosteum, or may be fractured off after suitable guiding perforations have been made. These fragments should be brought close enough together with a strong wire to relieve the wound of tension; if this procedure fails to relieve all tension, Langenbeck's method of partly or entirely severing the tensors and levators may be followed, but it is best, if possible, to preserve these muscles intact for their future function. No attempt is made to close the hard palate by surgical procedure; to the cleft between the bones is afterwards fitted, very accurately and slightly overlapping the margin, a plate of gold, silver or hard rubber, extending nearly but not quite to the posterior end of the cleft. To the upper surface of this plate, is attached a flexible soft rubber velum, which rests upon the natural velum and is shaped in moulds made from impressions and casts of the natural parts, so as to fit them exactly and imitate as exactly as possible the contour of the normal soft palate. This is attached to the artificial hard palate only in the median line from the anterior angle of the cleft to the posterior edge of the hard palate, filling up, when in position, the part of the cleft in the natura

palate, which is left uncovered by the rigid plate, and continuing beyond the free border of the natural velum as far as may be necessary to compensate for its defective length. By this method is obtained an artificial palate which is under perfect control of the palatine muscles and which is light and flexible enough to adapt itself to the changes in form of the tongue, pharynx and palate in all the movements of articulation, deglutition and respiration.—*N. Y. Med. Rec.* 1886. Feb. 20.

J. E. PILCHER, (U. S. Army).

CHEST AND ABDOMEN.

I. A Case of Laparotomy for Internal Strangulation, With a Singular Complication. By Dr. TH. S. FLATAU (Berlin). The author thinks that the following case may present points of special interest, as its course differs somewhat from that usually observed in such cases. On the 19th of July last, A. first saw patient, a young, healthy, married woman, æt. 25, who was suffering with pain, nausea and occasional vomiting, all of which she attributed to some cake she had partaken of too freely the previous day. There was no fever; the tongue was coated, and the epigastrium somewhat tender on pressure. Bowels had been regular up to date (incl). Regarding the symptoms as those of a simple gastritis, patient was treated accordingly, whereupon the pain subsided until the morning of the day following, when it returned accompanied also by slight vomiting. From the patient it was now first ascertained that she had had some abdominal trouble three years previously, after confinement, and at the beginning of this same year had suffered from peritonitis, following frequent and persistent hæmorrhages. A tubal pregnancy, resulting in the formation of a large hæmatocele, had been diagnosticated. This hæmatocele had become very much reduced in size, and the patient had entirely recovered.

On examination a small tumor, the size of a goose-egg, was found in the smaller pelvis, to the right of the uterus. The abdomen was soft and no tenderness of the tumor was present on pressure. The general condition of the patient was better than on the previous day, the pain and vomiting having ceased. The idea, at first entertained, of a direct connection between the present symptoms and the tumor, was aban-

done by the author and Prof. Dr. Schueler, who had been called in consultation. The possibility, however, of internal strangulation, caused by the residues of the former peritonitis, was kept in view, and the same palliative treatment continued. That evening patient had more vomiting and during the night the pain returned at times. The next morning (21st) renewed attacks of vomiting came on, and the general appearance of the patient was decidedly altered and worse. As well as could be ascertained there had been no faecal odor to the vomited stomach-contents, which were of greenish color, fluid and thin. No tympanites was present and the abdomen only slightly tender on pressure. The stomach was now washed out every three to four hours, and after the third repetition of the procedure the patient felt much relieved and fell into a sound slumber. Early in the morning of the following day (22nd) violent pain set in and faecal vomiting. It was decided to perform laparotomy at once. Incision was made in the linea alba, and the presenting intestine found diffusely hyperæmic. The tumor, mentioned above, lay in the right ileo-cæcal region, was connected with the uterus by a round cord, which proved to be the right tube. This was tied off and the tumor removed. Along the ileum in the smaller pelvis a loop of intestine was felt and lifted out. The intestine forming this loop was reddish brown and smooth, containing some thin fluid mass. It was constricted above by a band of tissue, evidently of old peritonitic origin, 3 ctm. in length, and 0.5 ctm. in width. This band arose from the free surface of the intestine forming the ascending and descending portions of the loop, the neck of which was very much constricted. On one spot below the neck, the intestine had become superficially necrotic, no perforation having taken place, however, as only the serosa seemed to be affected. The band of tissue having been excised, the rent in the serosa was united by fine catgut sutures, the necrotic edges being cut off. Nothing more abnormal was found. Abdomen closed and wound dressed. Hæmorrhage very slight during the operation, which lasted about two hours. Vomiting did not return. Patient did not rally, but died the same evening. The symptoms of intestinal obstruction, usually so characteristic and easily recognisable, were only partially developed in this case, and even then very tardily. There was no tympanites, and the pain was relatively slight and infre-

quent. Fæcal vomiting appeared later than is usual in such cases. The author thinks, however, that the washing out of the stomach, having for the time a quieting effect on the vomiting, may have simply masked the real condition of things, although this may also have been obscured by the fact that the symptoms of strangulation were left to develop themselves more slowly owing to the probably incomplete constriction of the intestine. The extirpated tumor proved to be of tubal origin.—*Deutsch. Med. Wochensch.* No. 6. Feb. 11. 1886.

C. J. COLLES (New York).

II. Laparotomy in the Treatment of Penetrating Wounds and Visceral Injuries of the Abdomen. By F. S. DENNIS, M. D. (New York.) Dividing the subject into (I) penetrating stab-wounds, (II) penetrating shot-wounds, and (III) rupture of the intestines, the author presents two successful cases of operation for the relief of the first class: 1. A stab-wound, through which a fold of intestine protruded, upon the surface of which were two wounds, one longitudinal and about two inches in length, through which fæcal extravasation had taken place, outside of the abdomen, however; the other involved only the peritoneal and muscular coats. The wounds of the intestine were closed with a Czerny-Lembert suture of catgut and, no other injury being detected upon enlarging the wound and drawing several inches of the gut out, and there being no signs of intra-abdominal extravasation, after antiseptic irrigation of the parts, the intestine was returned, the abdomen closed, and the patient passed on to recovery. 2. A stab-wound in the umbilical region, through which a piece of omentum protruded; three hours after the reception of the wound, an explorative laparotomy was made in the median line and the intestines carefully examined under mercuric bichloride irrigation; no wound being found, the abdomen was closed, the patient making a good recovery. He also reports two cases of stab-wound from which protruded a large amount of intestine, which was reduced, the wounds closed and the patients cured. A fifth case was one of penetrating wound of the stomach, which recovered without operation. He calls attention to the fact that volvulus can be produced by a stab-wound, which may cause peristaltic action and the development of a twist in

the long axis of the gut, and quotes a case in illustration ; in addition to the six cases referred to, he relates two unsuccessful cases of laparotomy for stab-wound, in one of which a portion of the small intestine was resected. He reports two cases in which he had performed laparotomy for pistol-shot-wound of the abdomen, in one of which the liver and portal vein were found to be wounded, while in the other there were seven wounds of the intestine, and from the wounded iliac veins proceeded severe hæmorrhage, both cases dying from loss of blood. He also gives two cases of shot-wound of the abdomen in which laparotomy was not performed, the former showing at the autopsy ten perforations of the gut, but no fæcal extravasation, and the latter two small openings only in the gut, with some fæcal extravasation, both of which might have been saved by a timely laparotomy. In connection with rupture of the intestine, he is able to discover but one case of operative interference—Owens having made an abdominal section and sutured the rupture, caused by the fall of a plank on the abdomen, not saving the patient's life, however—but he quotes ten fatal cases, where the operation would probably have saved life. Emphysema is the only reliable sign of rupture of the intestine, and collapse is the only constant one, although it is not pathognomonic ; the seat of the rupture is always in the small intestine ; the sudden contraction of the circular muscular fibres of the middle coat usually closes the opening and prevents extravasation ; he agrees with Gendron and Ollier that the accident is probably caused by the distended small intestine being pressed upon the vertebræ by a force acting in front and directed backward. He enumerates the signs of intestinal perforation in general, such as fæcal extravasation, which is pathognomonic, tympanites over the liver, sudden meteorism, shock, etc.; the persistency of the latter is of more significance than its severity, and should not deter the surgeon from performing laparotomy. In conclusion : 1. Penetrating stab-wounds of the abdomen are less fatal than penetrating shot-wounds. 2. If a stab-wound has injured the intestine or any abdominal organ laparotomy is indicated ; it may also be indicated in cases where the gut is not penetrated, but where it has become twisted as a result of a stab-wound. 3. In a penetrating stab-wound, regarding which doubt exists, the diagnosis should be made certain at once, in order to pursue a

proper line of treatment ; the indications for laparotomy should be extended also to injuries of any organs within the abdomen. 4. Laparotomy offers no great additional danger to the patient, if properly performed under the strictest antiseptic precautions. 5. While the number of exploratory laparotomies in stab-wounds of the abdomen affords insufficient data upon which to establish any fixed rule of practice, the same principle which is recognized in the performance of laparotomy for gunshot-wounds of the abdomen is applicable also to penetrating stab-wounds. 6. The enlargement of the original wound for an examination of the peritoneal cavity will not enable the surgeon to exclude, in all cases, faecal extravasation, perforation, volvulus or hæmorrhage all of which may exist and no evidences of their presence be manifest upon inspection through a small opening. 7. Neither the size, shape, character and velocity of the bullet, the attitude of the patient, the kind of weapon used to produce a stab-wound, should influence the question of laparotomy. 8. It is possible to have a fatal hæmorrhage from the large venous trunks in the abdomen, and for this hæmorrhage not to be discovered until the cavity is about to be closed, when an attempt is made to sponge out the bottom of the peritoneal cavity. 9. Sutures, if properly applied, will close the perforation in every case, no matter how lacerated these wounds are ; they will close the wound in case of resection of the gut, so that no leakage will occur if water is forced through the sutured intestines. 10. The success of laparotomy is to be obtained where every preparation for every emergency is complete and all the antiseptic conditions for the operation are perfect.—*Med. News*, 1886, February 27, and March 6.

III. Some Surgical Points in the Treatment of Perityphlitic Abscess. By W. T. BULL, M. D. (New York.) In perityphlitis the general symptoms and the local conditions may furnish valuable indications of the presence of pus, but thorough exploration with the needle is the best means of diagnosis. When pus is found, an outlet for it should be at once provided. The object of this paper is to urge the earlier and more frequent use of the exploring needle in these cases. Four cases are reported : (1) in which a diagnosis was made with the exploring needle and the abscess opened only forty-

eight hours after the patient had taken to bed; (2) in which, owing to the absence of constitutional symptoms, a week was allowed to elapse before the exploration was made, which showed that a large abscess existed all the time; (3) in which a large lumbar collection gave rise to dangerous symptoms following two discharges of pus per rectum, the local signs having been masked by the presence of gas in the abscess, and prompt relief was afforded by incision after the diagnosis had been rendered positive by the exploring needle; (4) the constitutional symptoms being very marked and a small amount of pus being drawn off by the needle, an incision was made, but no pus could be found; the incision, however, had a beneficial effect upon the case. The paper closes with a report of a case in which the patient had been suffering from symptoms referable to the right iliac region with pus in but small quantity in the lumbar region only; after death, the autopsy revealed a general suppurative peritonitis and perforation of the appendix in two places near the cœcum, with the fæces in connective tissue of the iliac fossa, which was softened and necrotic as far up as the liver but had not yet broken down so as to form much pus, and nowhere communicated with the peritoneal cavity.—*N. Y. Med. Rec.*, March 6.

EXTREMITIES.

I. A Case of Amputation of the Thigh Under Cocaine Anæsthesia. By T. R. VARICK, M.D. (Jersey City, N. J.) Ether being attended with alarming symptoms, cocaine anæsthesia after the method of Corning was exhibited in a case of a man who had received a compound fracture and in whom amputation at the thigh was demanded. The operation by antero-posterior flaps was done, no pain being experienced at the first incision through the integument, the second through the deeper tissues to the bone, the transfixion of the limb, the trimming of the flaps or the insertion of the sutures, but some pain was felt when the bone was attacked.—*N. Y. Med. Jour.* 1886. Feb. 20.

J. E. PILCHER (U. S. Army.)

II. Osteoplastic Resection of the Foot After Wladimirow-Mikulicz. By Dr. GEORG FISCHER (Hannover). Only fourteen of

Mikulicz's operations for caries of the tibio-tarsal joint and surrounding parts having been hitherto published, the author adds a new case to the list and then proceeds to describe and discuss the operation.

A girl, æt. 18, suffering from caries of the root of the foot, had been formerly treated with scraping-out of the calcaneus, without result. Osteoplastic resection of the foot was thereupon performed by the author, but without much effect; several of the smaller bones of the foot had to be subsequently removed, and even then recovery took place only very gradually and after repeated smaller operations. After one year, however, a good result was at last achieved.

Turning from this case to the subject in general, the author first presents the fifteen extant cases in tabular form, and then calls attention to the fact that, although the operation is generally named after Mikulicz, who described it in the *Arch. f. klin. Chirurg.*, Vol. 26, 1881., it had been previously described by Wladimirow, of Kasan. This author called the operation artificial pes equinus; he began the incision over the tuberosity of the scaphoid, carried it transversely across the sole of the foot to a finger's breadth behind the tuberosity of the fifth metatarsal bone.

From each terminus of this incision, be carried another incision, 13 centimetres in length, up to the centre of the malleoli and thence up the lateral aspects of the ankle, externally and internally, respectively. Chopart's articulation is then incised from below, the lateral and dorsal ligaments divided, and the soft parts of the dorsal aspect of the foot and the leg lifted off from the bones, care being taken not to injure the dorsal artery of the foot.

Transverse incision is then made through the soft tissues of the posterior surface of the leg, *à deux temps*, the long bone and fibula sawed through, and the cartilage of the posterior aspect of the scaphoid and cuboid bones removed with a chisel. These two bones are then brought into juxtaposition with the bones of the leg, and sutures and splints applied. The operation was recommended for caries and injuries to the root of the foot and the ankle-joint.

Mikulicz proposed quite similar incisions, but changed their order and their direction, which the author believes an improvement, since they are thus technically made easier, and a better survey is gained of

the field of operation. Mikulicz begins with the transverse incision at the back of the leg, and first opens the ankle-joint from behind, instead of later on from the front, and progresses downwards towards Chopart's articulation, with the enucleation of which he concludes. Mikulicz advocates the use of plate-sutures to shorten the front flaps, and also tenotomy of the flexor tendons, both of which the author thinks superfluous in many cases. He also thinks wiring of the bones together useless.

Reviewing the recorded cases, the author states that all operations of the kind described have hitherto been performed for caries, excepting one, which was done for syphilitic ulcer.

Two children were thus treated, all the rest were adults. Of the fifteen cases nine good functional results are recorded, two patients subsequently (eight or ten months after the recovery) died from pulmonary phthisis. In four cases no satisfactory result was obtained.

The stump, when recovery is good, is much more useful than the one after Pirogoff's operation, but the latter is less uncertain, in the opinion of the author, although a sufficient number of cases to justify criticism has not yet been published.—*Deutsch. Zeitschr. f. Chir.* Bd. 23. H. 1 and 2. Dec. 1885.

GENITO-URINARY ORGANS.

I. Cancer of Kidney. Nephrectomy. By Dr. W. ORLOWSKI (Warsaw). After some remarks relative to the statistics of the subject of nephrectomy (in 1883 132 cases had been published with 42 per cent mortality) and regarding the methods of making the incision, the author publishes one case.

A woman, æt. 37, had suffered pain for the last six years, occasioned by a movable, hard tumor of the size of a fist, situated in the right side of the abdomen. She had passed bloody urine. The diagnosis of neoplasm in a movable kidney was made. Operation May 15; incision extending from margin of ninth rib vertically downwards to Poupart's ligament, laterally along the external edge of the rectus abdominis muscle, 10 cm. in length. Enucleation of the tumor. Ligation of the pedicle *en masse*. The seat of the tumor remained in communication with the peritoneal cavity. Cat-gut and silk sutures to close

abdominal wound. Patient did well. May 22: suppuration of the wound till July 5. July 22: dismissed from hospital with granulating fistula, and passing 1500 cubic cm. of urine daily. Was seen again October 16, when a silk ligature had passed through the fistula by suppuration.—*Deutsch. Zeitschr. f. Chir.* Bd. 23. Hft. 1 and 2. Dec. 5. 1885.

W. W. VAN ARSDALE.

II. Two Cases of Suprapubic Cystotomy. By H. O. HYATT, M. D. (Kinston, N. C.) In connection with the report of these cases the writer remarks that the operation has also been performed successfully three times by Dr. H. T. Bahnson of Salem, N. C. Hyatt's first case occurred in a man, æt. 60, for the extraction of a piece of a jointed metal catheter which had been lost in the bladder during self-catheterization. The incision through the abdominal wall was made at the usual point, no effort being made to distend the bladder or to push the fundus up. The peritoneal cavity was unintentionally opened to the extent of three-quarters of an inch, and, after due deliberation, it was decided to close the opening by stitching the peritoneal surface of the bladder to that of the abdomen with silk, and to proceed with the operation. The bladder was then opened, the foreign body removed and the wound left open. The after treatment consisted in washing out the bladder daily with a warm dilute solution of permanganate of potash and cleansing the wound. The stitches were removed from the peritoneal wound on the fourth day. After the tenth day a curious phenomenon was observed, the patient being able to control the flow of urine through the wound as through the urethra. Recovery followed in four weeks. The second case occurred in a fleshy man, æt. 30, who had suffered from calculus for three years. No effort being made to direct the bladder toward the pubis, an incision three inches long was made in the median line and extended down between the bladder and the symphysis pubis, and, finding the neck of the bladder at the bottom of the wound, it was opened and three calculi, aggregating $1\frac{1}{4}$ ounces in weight, were extracted; under treatment similar to the first case recovery ensued rapidly. The reasons for opening the bladder at this point were: (1) to demonstrate that the suprapubic opera-

tion could be performed on an empty bladder, and (2) to open the viscus at a point where it's alternate expansion and contraction would not change the relative positions of the abdominal and vesical wounds, or interfere with the free escape of urine and pus. The writer disapproves of forcible distention of the bladder; in cases, however, where it can be distended by the voluntary retention of urine, he would prefer, because of its accessibility, to make the incision down to the fundus and then to fasten the upper angle of the bladder wound to the corresponding angle of the abdominal wound by passing a suture through the fundus, before the bladder is incised, out through the abdominal wall and tying it there; this proceeding is unnecessary, however, when the plan followed in the second case is adopted. In case of a large stone, the incision can be extended along the whole anterior vesical wall, if necessary.—*N. C. Med. Jour.* 1883. Dec.

III. Radical Treatment of Varicocele and Hydrocele. By E. L. KEYES, M. D. (New York). After a long experience in which nearly all the methods recommended had been tried without satisfaction, the author finally settled upon what appears to be "nearly ultimate simplicity" in treatment, as follows: The patient being in the erect posture—which precludes the use of general anæsthesia, which may be obtained locally, if required, by a few drops of 4% solution of cocaine injected at the point of puncture. The scrotum is thoroughly washed with a 1/1000 mercuric bichloride solution, by which also all other operative appliances are disinfected, and the veins which it is proposed to occlude, are separated from the rest of the spermatic cord at a point rather high up, where the separated dilated trunks may be made out as straight and not convoluted channels; the big veins are pushed out toward the thigh of the affected side and the scrotal tissues between the veins and the rest of the cord are tightly pinched by the thumb and finger of the operator's left hand, placed behind and in front of the scrotum. Now a needle made especially for the purpose with a handle and the eye near the point, and properly armed with a loop of silk and a carbolized catgut ligature, one-half millimeter in diameter, is boldly thrust through the scrotal tissues from before backward, at the pinched point, leaving the veins on the outer side of the

needle toward the thigh, and the eye of the needle is made to emerge at the back of the scrotum, where a tenaculum siezes the catgut and pulls it out of the eye of the needle, leaving it protruding from the posterior wound by the side of the shaft of the needle. Now the point of the needle is drawn within the scrotum, leaving the catgut end outside, and the veins are allowed to join the rest of the spermatic cord, care being taken not to withdraw the point of the needle outside of the anterior point of puncture in the scrotum. When the veins have passed internally to the point of the needle, the latter, still charged with its loop of silk, is manipulated around externally to the veins under the scrotal integument, and is made to emerge accurately at the posterior hole, the original point of puncture in the scrotum; this is the most important step in the operation and the only one at all difficult to execute accurately; when the eye of the needle has emerged posteriorly charged with its loop of silk, the tenaculum is again called into play to loosen the loop and to draw through it the free end of the catgut, which was left at the first puncture protruding posteriorly from the scrotum; the parts are again washed with the bichloride solution and the needle and loop, containing the catgut are withdrawn rapidly. It will be found that a few filaments of the dartos or other tissue just within the posterior wound in the scrotum are included in the catgut loop; these may be torn away by holding the free ends of the catgut in front and pulling upon the scrotum behind. Care being taken to pull away all hairs from the anterior wound so that they may not be tied into the knot and cause trouble, the catgut—again drenched with bichloride solution—is tied tightly in a triple knot, cut off short, and the scrotum pulled away. The knot sinks out of sight in the scrotum, leaving the dilated vessels effectually subcutaneously ligatured; the operation is terminated by placing small pieces of plaster over the minute points of puncture, if any blood exudes.

The operation for hydrocele consists of the injection of from eighty to sixty minims of deliquesced carbolic acid by means of a small hypodermic syringe into the dropsical sac, the contents of which have first been drawn off by means of the syringe, if the quantity be small, the point of the syringe being left in the cavity while the barrel is unscrewed and emptied; if the quantity be large, the point of the syringe

is introduced in the same manner, and then the contents of the sac are drawn off by a fine aspirator needle, after which the acid is injected by the hypodermic syringe.—*N. Y. Med. Rec.* 1886. Feb. 20.

J. E. PILCHER, (U. S. Army).

IV. Treatment of Urethral Gleet by Medicated Metal Bougies. By Dr. HUDSON. Medicines by the mouth and injections are condemned as being useless, the latter because it is very problematical if they ever reach the whole of the morbid mucous lining in these cases. The treatment, recommended and carried out by the author in eighty cases where the gleet had lasted over ten weeks, is the passage every fourth day of solid metal bulbous bougies gradually increasing in size to No. 14 English. The bougie is well smeared with oil: carbolic 1 in 20, and retained for ten minutes to commence with. At the next sitting resin ointment and iodoform (2 drachms to the ounce) is used and continued with if progress is made. As the bougies increase in size, they are retained in situ for a longer period, until at last in some of the most chronic cases, it may, with advantage, be left in for four or five hours. If after No. 14 has been used great improvement does not result, iodide of sulphur ointment and benzoated lard (equal parts) is substituted.

Fifty cases were entirely cured. Epididymitis occurred in one case only.

The good effect from this method is due to the long contact of the bougie and its medicament with the urethral canal. The cause of the gleet, apart from the stricture is mostly due to the spasmodic contraction of the urethral muscular and elastic fibers, reflex in character, which prevents the scattered patches of abraded mucous membrane from healing. When the urethra is thus brought to the extreme limit of distension, and kept so for a sufficient period, this muscular action is paralysed and ceases to act; irritability being removed analogous to what occurs in forcible dilatation of the sphincter for fissure of the anus. Mention is made of iodoform and other soluble bougies but Dr. Hudson says that they do not dilate the passage appreciably, and though often formerly used have never in his hands, per se, cured a case of long standing gleet.—*Lancet.* 1885. June 6.

V. Prostatectomy for Complete Obstruction to Micturition. By F. SWINFORD EDWARDS, F.R.C.S. A case is recorded in which the author performed the operation introduced by Mercier, of Paris, and modified by Gouley (viz.: of punching out a piece of the 3d prostatic lobe or obstructing bar by means of an exciseur), and which was completely successful, inasmuch as micturition, which before the operation had been impossible without the aid of a catheter, was restored and catheterism dispensed with. The paper then says that for cases of impeded micturition due to obstruction at the neck of the bladder, whether prostatic or valvular, there are three operations which alike aim at a cure, viz.: 1. Excision through a perineal incision. 2. Thermo-electric prostatotomy. 3. Mercier's operation, or prostatectomy, as it is called by Gouley. Of these three operations, Mr. Edwards, for reasons given, prefers the last, and recommends that it should be undertaken early in the course of the disease, i. e., before the patient has to take to habitual catheterism with all its inconveniences and attendant risks.—*Lancet.* 1885. July 11.

VI. The Treatment of Some Chronic Forms of Suppuration From the Male Urethra. By REGINALD HARRISON, F.R.C.S. After expressing the opinion that some chronic urethral discharges are capable of cure by the treatment of injections and irrigations, the author advocates (where all else has failed?) incision into the membranous urethra for the purpose of diverting the stream of urine and thus giving rest to the urethra. An india-rubber tube is passed through the perineal opening into the bladder, retained there, and through this the patient passes all his water. At the same time the urethra is to be frequently washed out with warm water. A case of four years' duration is related which had resisted all the usual methods of treatment, even including internal urethrotomy, but which was cured by this means. The perineal tube was allowed to remain in situ in this case for twenty-five days. Ten days after its removal the wound was healed.—*Lancet.* 1885. Sept. 5.

VII. Suprapubic Lithotomy. By Sir HENRY THOMPSON. Before discussing the operation for stone, he remarks that stones of uric acid, weighing 2 oz or more, are quite capable of being crushed. Had

himself crushed a uric acid calculus weighing $2\frac{3}{4}$ oz. with a successful result. Phosphatic calculi although of larger weight may be thus dealt with. There are, however, calculi too large and too hard to be safely subjected to lithotripsy. For such stones the supra-pubic operation as performed by Petersen, of Kiel, is strongly recommended. Sir Henry even goes further and says that he believes that this operation will prove safer and easier in the hands of most surgeons for hard calculi weighing only $1\frac{1}{2}$ oz and upwards.

The following is the method adopted by Sir Hy. Thompson in performing this operation: The rectum is first distended by an india-rubber bag, into which is thrown 12 to 14 ounces of water. A catheter is then passed, and through this an antiseptic solution is injected to the amount of 6, 8 or 10 ounces, without force. The catheter is then withdrawn and the penis encircled firmly by an india-rubber tube.

A vertical incision is now made in the middle line over the salient bladder reaching well down to the pubes; after the linea alba and fascia transversalis have been cut through the prevesical fat comes into view, and on scraping through this with the finger-nail the bladder wall is reached. Into this is inserted a sharp hook and thus fixed it is incised and the finger introduced. The stone is extracted by means of both fore-fingers acting as forceps, or failing in this by forceps themselves. Neither the bladder nor abdominal wounds are closed, but a rubber tube is left in for the first twenty-four hours, and sometimes a soft catheter is retained in the urethra, both being removed in two or three days. The patient lies on his back for the first twenty-four hours and then on each side alternately for six hours at a time. Carbolic or boracic lint is the only dressing used. Eight cases are given where the author has performed this operation.

	<i>Sex.</i>	<i>Age.</i>	<i>Stone or Tumor.</i>	<i>Weight.</i>	<i>Result.</i>
1.	Man.	36.	Cystine calculus.	2 ³ / ₄ oz.	Recovered.
2.	Boy.	12.	Calculus.	1 ¹ / ₂ oz.	Recovered.
3.	Man.	73.	Calculus.	1 ¹ / ₂ oz.	Recovered.
4.	Man.	62.	Uric Acid.	14 oz.	Recovered.
5.	Man.	70.	Calculus.	1 ³ / ₄ oz.	Died of exhaustion on the 9th day.
6.	Man.	76.	Calculus.	6 ¹ / ₂ oz.	Recovered.
7.	Lady.	73.	Large papilloma.		Recovering.
8.	Man.	52.	Large fibro-papilloma.		Recovering.

—*Lancet.* 1885. Dec. 5.

VIII. The Treatment of Urethral Stricture by Electrolysis. By S. T. ANDERSON, M.D. Records four cases treated by this means. In the first case a No. 17 French electrode bougie passed into the bladder in twenty-three minutes. Orchitis supervened but the patient is said to be well fifteen months after the operation. In the second case there were two strictures, first at 1¹/₂ in. and the second at 7 in., the latter being impassable. As the battery was weak the current was raised to sixteen cells, An electrode No. 14 French, worked its way into the bladder in thirteen minutes. Three weeks later a No. 17 electrode passed through in eight minutes with a current from eleven cells. Five months afterwards the patient remained cured of his stricture. The third case (which does not seem to have been so successful) was one of stricture situate in quite the anterior part of the urethra. Some months were occupied in the treatment when a No. 11 electrode passed with care. The case is still under treatment. In case four there were two strictures, the posterior or deep being of eight years' duration. After the first operation with a No. 9 electrode and a current from seven cells, much relief was experienced. A month later, under chloroform, a No. 12 bougie was made to absorb the strictures, so that the passage of the instrument became quite easy. Four days after patient said he had no trouble. Since then the urethra has been enlarged at the seat of the strictures, and improvement is continuous and satisfactory.

The communication ends by an enumeration of the advantages of this method. 1st. Anæsthetics are seldom required. 2d. No hæmorrhage. 3rd. Usually no pain. 4th. Does not ordinarily interfere with business.

So far, no failures have occurred in the author's practice.—*Lancet*. 1885. Dec. 5.

VIII. On a New Procedure for the Removal of Small Calculi From the Bladder in Male Children. By THOMAS ANNANDALE. Having commented upon the risks attaching to lateral lithotomy in children, a case is reported of a boy, æt. $4\frac{1}{2}$, the subject of a small stone, for which the author performed the following operation: Under chloroform the urethra was dilated, a small lithotrite passed and the stone seized, the bladder having been previously filled with $\frac{3}{4}$ iv. of antiseptic fluid (corrosive sublimate 1 to 4,000). The handle of the instrument was then depressed, causing its vesical extremity together with the stone to be felt through the abdominal wall immediately above the pubes. A small incision was then made on to this, which allowed the blades of the lithotrite together with the stone to be pushed through the wound. The stone was extracted and a No. 9 india-rubber catheter was seized and drawn into the bladder and along the urethra as the lithotrite was removed, for drainage purposes. The abdominal wound was closed, a tube being inserted. For the first thirty-six hours urine passed by the wound, but after this it flowed through the catheter. After forty-eight hours both catheter and tube were removed. The patient was running about the ward quite well on the tenth day after the operation.

This, Mr. Annandale maintains, is a much less serious proceeding than the ordinary supra-pubic operation, as the bladder is scarcely disturbed, and the wound made in it is very limited. Attention is drawn to the fact that the same principle might be carried out in certain cases by bringing the stone to the neck of the bladder, opening the prostatic urethra and thrusting the blades of the lithotrite and stone into the perineal wound.—*Brit. Med. Jour.* 1886. Jan. 2.

X. Thirty-Two Calculi in the Prostatic Urethra Extracted Through the Perineum. By M. SEVTEX. The subject of this

had been treated for gonorrhœa by irritating injections, which was followed by retention of urine, and for which during fourteen months recourse was had to the catheter. The act of micturition, when regained, was painful, and a pouch, which the patient could empty by pressure, had formed in the perineum. Some time afterwards he suffered from nephritic colic and passed fourteen small calculi.

On sounding, M. Seutex found several calculi in the region of the prostate, which was verified by rectal examination. He believed the bladder to be free. Extraction; urethrotomy was performed and thirty-two calculi extracted weighing 52 grammes, consisting of ammonio-magnesian phosphates.—*Société de Chirurgie.* Oct. 28, 1885.

XI. Foreign Bodies in the Urethra and Bladder. Ext. Urethrotomy and Bilateral Cystotomy—Cure. By M. DESPRES. A sailor having broken a piece of wood in his urethra endeavored to fish it out with a bent pin, the result being that the pin was also lost in the urethra. On coming under the care of M. Després it was ascertained that the piece of wood was situated in the neck of the bladder, probably extending into the prostatic urethra, and the pin was lodged in the bulbous urethra. This latter was cut down upon and extracted easily, but failing to grasp the piece of wood by means of a small lithotrite introduced through the wound, after several attempts, further measures were left until after the perineal wound was healed. Perineal cystotomy was then performed, the prostate being incised bi-laterally by means of a lithotome, the separation of whose blades was limited to 13 m. m. The splinter of wood came away on syringing, and the patient convalesced in twenty-eight days.—*Société de Chirurgie.* 1885. Oct. 7.

F. SWINFORD EDWARDS (London).

WOUNDS—INJURIES—ACCIDENTS.

I. Antiseptic Tamponade and Secondary Suture. By Dr. SPRENGEL (Dresden). This method of treating operative wounds was brought forward by Kocher in 1882. Secondary suture with bismuth dressing was rather unfavorably reported on by Riedel in 1883. Bergmann rehabilitated it last year, plugging the wound with iodoform

gauze where hæmorrhage was feared, otherwise simply covering it with same.

This method is suitable (1) where, after-hæmorrhage is liable to occur; (2) where there is any special reason to fear that repair may prevent primary union.

In S's first case he injured a large vein in the neck while removing enlarged cervical gland. The vessel could not be easily grasped and bled profusely. He firmly tamponned the wound. Thus it remained four days, when the wound appearing aseptic he closed it. Immediate reunion. His next case was the removal of fistulous goitre. It had suppurated from former injections and been incised, leaving the fistule. In view of the age of the patient, 65 years, and her weak condition, he concluded to tampon with iodoform gauze instead of immediately closing the wound. The first bandage was changed, and the wound sutured on the fifth day. It healed with a smooth linear scar. In another case of extirpation of a cyst of the thyroid the cavity with bleeding parenchymatous walls and extending even behind the sternum was plugged, a drain being first introduced. Compress bandage over all. Patient got up on third day. Suture of wound on fourth. Smooth cicatrix.

Next case was a saw-wound of the hand. The second interphalangeal joint of the index finger had been laid wide open and the lateral ligament completely severed. The wound was cleansed, its torn edges were removed, and the joint filled with iodoform gauze—the peripheral portion of the finger hanging by a well-nourished flap. Secondary suture without drainage on the third day. Linear cicatrix on second change of bandage two weeks later.

His last case was that of a boy, æt. 9 $\frac{1}{2}$, who had swallowed a pin. It was implanted to the left of the laryngeal entrance. Unsuccessful attempt at removing it by the mouth. Incision of the hyo-thyroid ligament and removal of the pin. In consideration of the internal opening, though small, it was thought best to tampon with the gauze. Suture in two days. Rapid union.

W. BROWNING (Brooklyn).

ULCERS, ABSCESSSES, TUMORS.

I. Seven Cases of Hydatid Tumors Cured by Operative Treatment. Published by Dr. GUST. LIHOTZKY of Prof. Albert's surgical clinic of the University of Vienna.

In this article, which is very ably written and very interesting to read, the author confines himself principally to the discussion of the methods in use for operative treatment of hydatid cysts of intraperitoneal localization, eight cases of which have been seen in Vienna during the last eighteen months. He is greatly in favor of Volkmann's method. Of the more ancient methods only two are still practiced: Tapping to empty the sac, and Simon's method of introducing two trocars to produce adhesions and then incising the sac. Both of these methods are dangerous, in the opinion of the author, especially for the reason that the contents of the sac may enter the peritoneal cavity and here produce multilocular infection of the peritoneum with hydatid disease; he concedes that the fluid contained in the sac does not produce septic peritonitis, but points out that both the methods mentioned show bad results.

The best methods to follow in antiseptic surgery are those known as Lindemann's and Volkmann's. Both consist in fixation of the sac followed by incision, the latter act being postponed by Volkmann for several days, till adhesions have formed.

Thus according to Volkmann, an incision five or six cm. in length is made over the tumor, dividing the abdominal wall down to the visceral lamella of the peritoneum. The wound is then packed with iodoform gauze. After lapse of five or six days incision can be made into the sac without danger, or the cyst can be emptied with a trocar, or laid open with the cautery. The sac is then to be cleansed and irrigated, drainage tubes inserted, and an antiseptic dressing applied, irrigation being daily repeated. After three weeks the patient is able to walk about, and the fistula heals after three or four months.

Lindemann's method consists in making an abdominal incision down to the parietal portion of the peritoneum and uniting it by means of sutures with the abdominal wall. Thereupon the cyst is secured by two silk ligatures and lifted up into the wound by their means, so as

to "hermetically occlude" the peritoneal cavity. The sac is then incised and the contents removed. The edges of the incised wound of the sac are then sutured by means of close sutures to the abdominal wound, and antiseptic dressing applied.

The author publishes five cases, four hepatic echinococci, and one of the spleen, which were all successfully treated after Volkmann's method, and adds one case of hydatid tumor of the great omentum, and one of the nuchal region, both of which were likewise operated upon and cured.

Treating of the statistics of the operations under discussion the author completes Korach's table of eighteen collected cases, published in May, 1883, by adding twenty-four further cases. The mortality percentage now amounts 4.7%, two cases having died of forty-two. All (seventeen) operations performed after Volkmann's method were successful, a great advance when compared to the methods of tapping and introduction of trocars, which latter was formerly considered the safest one, although attended by a mortality of $33\frac{1}{3}$ per cent.—*Deutsch. Zeitschr. für Chirurg.* Bd. 23. Hft. 1 and 2. Dec. 1885.

BONES, JOINTS, ORTHOPÆDIC.

I. On the Treatment and final Results of Transverse Fractures of the Patella. By Dr. CONRAD BRUNNER (of the Surgical Clinic of the University of Zürich.)

In this memoir, seventy pages in length and containing twenty-six pages of cases and nine pages of tabular synopsis, the author endeavors to answer the question whether operative interference is indicated in cases of recent subcutaneous fractures of the patella. In order to gain a fair decision, he first examines the cases treated during the last twenty-five years at the Zürich Clinic without operation, thirty-nine in number, and then proceeds to review the cases already published of operative treatment, and finally compares the two. By this means he arrives at the decision that, while compound fractures of the patella require to be sutured, suture of recent subcutaneous fractures is too dangerous to be practiced, but may become necessary in less recent fractures, if the impairment of function demands interference.

As regards the new cases, the most important feature of the article,

there are forty-four in all, five of which were compound, three subcutaneous comminutive fractures, and three simple fractures without separation of the fragments. Ten of the cases were treated by Billroth, eighteen by E. Rose and fifteen by Krönlein, each of these surgeons using somewhat different methods. Billroth applied adhesive plaster to the extended limb, and covered it with plaster of Paris, keeping the leg elevated. This treatment was repeated three or four times and the patient was not allowed to walk till after eight weeks.

Rose applied simple roller-bandages in the form of the testudo, and repeated this frequently; or else he followed Roser's method of applying a fenestrated plaster of Paris covering, and brought the fragments into juxtaposition by stuffing wads of cotton between the edges of the patella and of the opening. Elastic bandaging after Boyer was tried, but had to be given up. Bandaging was never attempted before the effusion into the joint had been absorbed, at earliest after one week.

Krönlein used Malgaigne's hook modified by Trélat—plates of gutta-percha being first adapted above and below the patella, then united by the clamp and screwed together, the whole being covered with adhesive plaster—or in cases of slight displacement merely plaster of Paris.

The thirty-one cases of transverse fracture with diastasis of the fragments occurred most frequently between the ages of 30 and 50, males being by far in the majority. Twenty-five of these cases occurred through direct violence, and only five by means of muscular action. Diagnosis was always simple, dislocation and lateral abnormal motion being always present. Effusion into the joint was more or less marked, and was not absorbed before one or two weeks. The place of fracture was in the middle in seventeen cases; in seven cases it was above, in one below the middle. The fragments united on an average in forty days.

In twenty-seven of the cases fibrous union took place; two cases are recorded with osseous union. The intermediate substance measured from 2 millimetres to $2\frac{1}{2}$ cm. Statements as to atrophy of the extensor-muscles are incomplete; in one case the thigh decreased 6 cm. in three weeks. The patient was permitted to walk with a stiff knee after sixty or seventy days, and was generally dismissed from the hospital

after nine or ten weeks. Apparatus for supporting the knee, it was found, was always soon discarded by the patient.

In all cases the patients were able to walk, and mostly without the help of a cane, although the knee could be but little bent.

The author was able to examine twenty-four of the patients at a much later date. Only in two of these cases walking was impeded, by arthritis deformans and ankylosis respectively. Seven of the patients limped; in three cases normal conditions had obtained, though, generally speaking, flexion was impeded. In one case the author believes ossification of a primarily fibrous union to have taken place after ten years. In no case did the ligamentous union again rupture, though elongation more frequently occurred.

After comparing these results with those of other authors, the writer briefly describes his three cases without diastasis of the fragments, which all did well, as well as two cases of repeated fractures, that refused treatment, and five cases of compound fractures, one of which was successfully treated with suture.

The author then turns his attention to the operative treatment of patellar fractures as represented by the publications of various authors, without, however, describing the operative technique at all.

Tapping of the joint, though warmly advocated by Schede, appears to have been little noticed by authors in publishing their results. Schede and English more frequently got osseous union after tapping than with other methods, but neither Hamilton nor the author did so. Neither does tapping, in the opinion of the author, shorten the time of treatment (seventy days), and the functional results are no better. He admits its use in large effusions and hæmorrhages, but believes it unnecessary in lesser ones.

Another operative measure consists in uniting the tendon of the quadriceps muscle with the patellar ligament by means of a silk suture, the knot being tied over the skin upon the patella (Volkmann's tendon-suture.) Kocher's peri-patellar suture, consisting in passing a silver wire above and below the patella, is also mentioned. Both of these methods the author thinks too dangerous to execute, suppuration and even death having occurred in consequence.

As to suture of the patella recommended, and so successfully ex-

cuted, by Lister, over one hundred cases have been published with varying results. The incision may be made either longitudinally or transversely; the silver wire, generally used for uniting the fragments, was usually removed after six or eight weeks.

In two tables the author enumerates the recent and the older cases treated by wiring the fragments of the patella. The patients' ages ranged between 20 and 78, the greatest number being between 20 and 40. The union achieved in forty-five fresh cases was osseous in sixteen, fibrous in five, unknown in nine, of the cases, and in others death (two) or amputation (two) interfered. In thirteen cases perfect function was obtained (Lister); in seven ankylosis ensued; and in eight suppuration of the knee-joint took place. In forty-five old fractures, twenty-one cases of osseous, seven of fibrous union are recorded. The results were perfect in seven cases, and ankylosis occurred seven times.

The author therefore concludes suture of the patella to be a very dangerous proceeding in recent cases of simple fracture, especially as excellent results as to function can be obtained without operative interference. He concedes, however, that the treatment may be of shorter duration, that osseous union is not so frequently obtained, and that muscular atrophy is prevented by suturing the patella. On the other hand, he contends that ligamentous union is no more liable to rupture than bone, and believes that the length of the ligamentous band (in one case of double fracture 6 cm. in length) does not materially impede the walking. He calls attention to the necessity of treating the muscular atrophy of the quadriceps by electricity. In badly healed fractures, as well as compound fractures, the author believes operative treatment indicated.—*Deutsch. Zeitschr. f. Chir.* Bd. 23. H. 1 and 2. Dec. 1885.

W. W. VAN ARSDALE (New York).

II. Antiseptic Irrigation of the Knee-Joint for Chronic Serous Synovitis. By R. F. WEIR, M. D. (New York.) With the clinical histories of seven cases in which this method was followed successfully, a brief historical sketch is given. After referring to the lack of recognition by surgical authors, he notes with approval its uses in

subacute and chronic synovitis, pyarthrosis, hydrops articuli, where it should be done at once, and in certain cases of gouty synovitis, and mentions the fact that it has been used in acute synovitis, with painful distention, and in hæmarthrosis. He has also found it of value in the lingering effusions that so often remain obstinate to other treatment. The puncture is made at the inner or outer side of the upper synovial pouch after it has been rendered more tense by the pressure on the other side of the joint with the hand of the surgeon or assistant. If this pressure is carefully managed, not only at this stage, but also during each evacuation of the joint being gradually removed while the joint is gradually filling up with the carbolic solution, there will be no entrance of air into the articulation. After the joint is evacuated through a rather large-sized canula, a 1 to 20 warm carbolic solution is allowed to flow from a fountain syringe through the canula until the joint is distended, when it is allowed to flow out. This is repeated until the fluid comes out nearly or quite clear or with only a small amount of opalescence due to the action of the carbolic acid on the albuminous contents of the joint. The articulation being finally emptied, and firm pressure being yet made, the canula is suddenly withdrawn and a mass of antiseptic sublimated gauze, on which some iodoform has been dusted, is placed quickly over the opening. Several layers of antiseptic material covered by a plentiful supply of absorbent cotton are then secured about the knee by a bandage and the limb immobilized by a splint.—*N. Y. Med. Jour.* 1886. Feb. 20.

GYNÆCOLOGICAL.

I. Cæsarean Section on Account of a Fibroid Tumor of the Cervix Uteri. By J. R. WEIST, M. D. (Richmond, Ind.) A primipara, æt. 43, having arrived at full term, parturition was found to be impossible because of a large fibroid tumor of the cervix uteri, filling the entire pelvis. Both laparo-elytrotomy and ovaro-hysterectomy being clearly impossible, Cæsarean section was performed with careful antiseptic precautions. Through an incision in the uterus five inches in length, the child was delivered and the placenta removed. The hæmorrhage, not dangerous before delivery, became alarming later owing to non-contraction of the uterus, which was finally secured

by hypodermic injections of ergotine. The incision was closed with the Snger sutures, but the patient died twenty-four hours after the operation.—*N. Y. Med. Record.* 1886. March 13.

II. Vaginal Extirpation of the Uterus. By E. J. ILL, M. D. (Newark, N. J.) The patient, a quintipara, t. 42, was found to be affected with a cauliflower growth of the cervix uteri and kolpohysterectomy by the method of Fritsch was decided upon. Enough of the cancerous mass was first removed to permit the wound to be stitched up with four deep sutures, which controlled all hmorrhage. The lateral incisions having been made, they were joined by an incision through the vagina into the vesico-uterine cul-de-sac, the loose cellular tissues being broken up with the finger or scissors and the bladder being guarded from injury by a sound, which pushed it up. The peritoneum, presenting, was cut and stitched to the vagina and a sponge held by a string in the hands of an assistant, was inserted in the peritoneal cavity. The retroverted fundus of the uterus was now anteverted and drawn down out of the opening, the broad ligaments ligatured in two places, cut between the ligatures successively and the uterus removed. Hmorrhage from a wound caused by the insertion of a tenaculum into the uterus in drawing it down caused considerable trouble, and was finally controlled by an elastic ligature about the fundus; some delay was also caused by a failure to sever the whole base of the broad ligament at first, and, it seeming to be impracticable to reach it, the uterus was retroverted and attacked through the sac of Douglas. The operation lasted four hours and a half. The patient rallied well, and was discharged from the hospital on the twenty-first day with some ligatures still remaining in the wound. She made a good recovery, and after eight months seemed to be perfectly well. The account of the case is closed by a table of 137 cases of the operation.—*N. Y. Med. Jour.* 1886. Feb. 18.

III. The Treatment of Pelvic Abscess in Women. By P. F. MUNDE (New York.) In connection with ten cases, which he details, the author concludes that (1) pelvic abscess in the female is not very common in proportion to the great frequency of pelvic exudations probably not occurring in more than ten per cent of cases, the major-

ity terminating in spontaneous absorption ; (2) it may be the result of cellulitis, extraperitoneal, or the result of pelvic peritonitis, intra-peritoneal, and in the latter case the adhesive inflammation between the pelvic viscera and the intestines may seal the abscess-cavity so as to render it practically extra-peritoneal. Abscess of the ovary and pyosalpinx are not pelvic abscesses properly, nor subject to the same therapeutic rules, except when, by agglutination to the abdominal wall or sac of Douglas they become virtually extra-peritoneal ; (3) small deep-seated pelvic abscesses of a capacity not exceeding two ounces and minute multiple abscesses in the cellular tissue can often be permanently cured by evacuating the pus thoroughly with the aspirator, the surrounding exudation being absorbed. (4) About one-half of the abscesses open spontaneously into the vagina, rectum, bladder or through the abdominal wall and ischiatic fossa ; these cases may gradually recover or the sinuses may persist until closed by surgical interference. (5) Abscesses containing more than two ounces of pus should be opened by free incision along an exploring needle or a grooved director, cleared of débris by finger or blunt curette and drained and irrigated, if necessary, through a drainage tube. (6) The incision should be made at the spot where the pus points most distinctly, usually the vaginal vault. (7) In a certain number of cases, the pus points through the abdominal wall generally in the iliac fossa, in which cases the incision should be ample and free drainage secured. (8) When the pus has burrowed deep into the pelvic cavity, and a probe can be passed from the abdominal incision down to the vaginal roof, mere abdomino-cutaneous drainage will not suffice, and a drainage tube must be carried from the abdominal wound through a counter opening into the vagina, care being taken not to wound the bladder ; the drainage tube may have to be worn for months. (9) The opening of a pelvic abscess, which points through the abdominal wall, is not an "abdominal section" or a "laparotomy" in the sense that these terms are now used to indicate the surgical opening of the peritoneal cavity, does not differ from and is no more dangerous than the same operation elsewhere on the cutaneous surface of the body. (10) Chronic pelvic abscesses, which have burst spontaneously, and have discharged through the vagina, rectum, or elsewhere for months

or years, are exceedingly difficult to cure, particularly when the opening is high up in the rectum; a counter-opening in the vagina or enlarging the opening if there situated, the curette, stimulating irrigations, etc., may occasionally succeed, but usually fail. (11) A perityphlitic abscess may point through the abdominal wall and simulate a pelvic abscess proper, aspiration will settle the diagnosis and the treatment is identical. (12) The majority of cases of pelvic abscess recover: at least the mortality is small.—*Amer. Jour. Obstetrics.* 1886. Feb.

J. E. PILCHER (U. S. Army).

REVIEWS OF BOOKS.

I. THE SURGICAL DISEASES OF CHILDREN. By EDMUND OWEN, M.B., F.R.C.S., Surgeon to the Hospital for Sick Children, Surgeon to St. Mary's Hospital, etc., etc. Cassell & Company : London, New York. 1885.

One is immediately struck, on reading this book, with its agreeable style and the evidence it everywhere presents of the practical familiarity of its author with his subject. Mr. Owen's literary efforts have previously shown a certain tendency to be a little ornate ; but this tendency disappears in the manual before us and leaves a simple, clear and unaffected work, exceedingly pleasant to read.

As specimens of the minor practical hints scattered throughout the book, the following may be quoted :

"When asked to see a child who is feverish without apparent cause, the surgeon should at once inspect the throat. Such a rule is excellent, as diphtheria is apt to come on very insidiously."

"The nurse" (of a tracheotomy case) "should see, before the household retires to rest, that she has enough coal, methylated spirit for the spray, antiseptics, stimulants, ice, and food to last through the night, and plenty of feathers and torn pieces of sponge for keeping the tube clear. It is unsafe to leave the child for a moment unattended."

The critic is naturally more interested in those sections of the book which deal with questions keenly debated, than in those which give an account of generally accepted facts. With regard to the latter they are given by Mr. Owen with accuracy and with as much fulness as the size of his book (500, 8vo. pages) will permit.

At page 490, credit is given to Mr. Walsham for what is due to Mr. Willett. It was the latter who devised the plan of resecting the tendo-Achillis splicewise. Mr. Walsham made the important advance of substituting animal for silver sutures. I have had a fair experience of this operation, and have followed my patients for a longer time than the above mentioned surgeons report themselves as having done ; and I think the results of the operation scarcely worth its performance.

Mr. Owen is excellent in his remarks on operations for disease of the ankle-joint ; he says, truly, that formal and complete excision can

seldom be indicated. He does not describe Ollier's operation, lately noticed in this Review.

Thomas' hip and knee-splints are enthusiastically praised.

Double hip-joint disease deserves a longer notice than it gets. Nothing is recommended but Thomas' double splint. Perhaps the author felt that the limits of his work would scarcely permit him to do justice to these interesting cases, which cannot be all treated properly on a uniform plan.

In answer to the question, "When may Thomas' splint be left off?" he writes, "When all deformity and pain have passed away." This answer is not satisfactory, because Thomas' splint is not competent to remove *all* the deformity of many cases. I would rather suggest "when all signs of active disease have disappeared for six months in an advanced case, and for three months in an incipient one." The patient should still be kept under observation, and the splint reapplied, or other measures taken, if necessary.

In the author's account of traumatic cephal-hydrocele, he implies that it cannot occur after *compound* fracture of the skull. This is a mistake. I have had such a case under my own care.

In referring to scraping out the medulla of long bones for osteomyelitis, it might have been noticed that this operation is most frequently applicable as a supplement to excision of, and amputations near joints.

The chapter on "Lateral Curvature of the Spine" is not so good as the rest of the book. Although most of the sufferers from this are attacked in childhood, it is usually at an age a little later than that of the patients at a children's hospital.

The chapter on hernia betrays a certain amount of uncertainty and vagueness in the author's mind, which is a condition he probably shares with a good many other surgeons just now.

Some of it is calculated to discourage the use of the truss in childhood. The management of a truss to the child's great benefit, and with the probable effect of radically curing a congenital hernia, presents no real difficulty to a good nurse or attentive mother; and certainly the advice on feeding, nursing, etc., afforded by Mr. Owen would be wasted on any other kind of mother or nurse.

Sal ammoniac lotion for hydrocele in infancy is condemned unjustly. It is a curious thing that the author, who sees so many objections to the use of a truss for congenital hernia, lauds it for congenital hydrocele.

There is a very good chapter on "Incontinence."

The author is inclined to speak well of lithotrity (at one sitting) in boyhood.

Writing of osteotomy, he says: "The progress of the osteotome is to be carefully watched; one had heard of an excellent and trustworthy surgeon driving the cutting edge right through the limb, and even into the sand pillow on which it rested."

He writes of *nævi* that even when a large one is brought for treatment, "no thought need be given to sodic ethylate, vaccination, seton or ligature, reliance being placed on the thermo-cautery or electrolysis."

Concerning that not infrequent accident, the slipping of a drainage tube into the pleural cavity, Mr. Owen says: "On slightly enlarging the wound, wedging the ribs asunder (perhaps with necrosis forceps), and searching the cavity with the finger, the tube may generally be found and extracted with forceps." "Neither probe nor forceps can recognize by the touch an india-rubber tube."

The best age for operating on cleft-palate he states to be the third year.

He has a very high opinion of the plaster of Paris jacket as a treatment for caries of the spine; but he does not suspend his patients.

The book may be honestly recommended to both students and practitioners. It is full of sound information, pleasantly given.

C. B. KEETLEY.

II. FRACTURES AND DISLOCATIONS. By T. PICKERING PICK, F. R. C. S., Surgeon to, and Lecturer on Surgery at, St. George's Hospital, Etc., Etc. (Ninety-three engravings.) Cassell & Co.: London, New York, Etc. 8vo. Pp. 524.

The author, in his preface, writes: "If I have succeeded in producing a treatise which shall prove a trustworthy guide to the practitioner of medicine and surgery in dealing with the common forms of fracture and dislocations which may come under his notice, and at the same time a treatise for the student which shall enable him to obtain a clear and comprehensive knowledge of the subject, the ends I have had in view will be accomplished."

The author has undoubtedly succeeded in his attempt, and we can conscientiously recommend the book to both students and practitioners.

If the author of a book on fractures and dislocations wishes to write much that is *new* as well as important, he must boldly approach the subject from a different side to that which presented itself in the foreground to Hamilton and the other authors of classical treatises. In

other words, he must give proportionately far greater prominence to compound injuries, to complicated injuries, and to those numerous cases in which antiseptic surgery justifies, or is said to justify, lines of treatment which a few years ago would have been universally condemned as murderous. Mr. Pick has not chosen to do this. He writes on conservative lines; and although he constantly gives evidence of plenty of personal experience and of considerable acquaintance with the modern English literature of the subject, the reader sees at once that the harvest in the field in which our author is mainly working, was long ago reaped and gathered by men who left little but straw for their successors to glean.

Astley Cooper and his great French contemporaries found in dealing with simple fractures and dislocations an almost perfect antiseptic system provided by nature; and the masterly way in which they worked in the only department of the subject in which the best work was then possible, might well make our Volkmanns, Ogstons and MacEwens shudder to think how barren of possibilities of invention the whole field of surgery might now be if the methods of Lister had been understood at Guy's and at the Hotel Dieu when this century was young.

We know, by personal experience, how difficult, not to say impossible, it is to bring the first edition of a book up to one's own ideal standard, and it is therefore not with any desire to condemn the present, but with a wish to stimulate to improvement in the future, that we point out the inadequacy of all the sections and paragraphs in this book which deal with compound and with complicated fractures. The general section on the treatment of compound fractures is quite unworthy of the rest of the book. Upon the question of saving or amputating the limb, all the author chooses to tell the reader is that the latter must remember that a limb to be worth saving must be in such a condition that it may be expected, when saved, to be a useful limb. The whole four and a half pages of which the section at present consists might be torn out without inflicting any injury, except the physical one, on the book. The greater part of one of these pages is devoted to recommending and describing the treatment of the wound, if small, by "a pledget of unravelled lint, soaked in the patient's blood, placed over the wound," etc. Lister's antiseptic methods are recommended "when the wound is large, with contused and lacerated edges, with considerable laceration of the soft parts, and, it may be, comminution of the bones." It amazes us to find not a single practical hint or caution as to details or advisable variations. Before sitting down to prepare this part for the next edition, the author should read over

thoughtfully the notes of his own cases of compound fractures antiseptically treated, as well as some of the contributions of other surgeons to the same department of literature. He would then give us an entirely new chapter of great value.

If we turn to those individual fractures which are most frequently compound or complicated, e. g., fracture of the tibia, and fracture of the pelvis, the same deficiencies are still conspicuous. Laceration of the urethra as a complication of fractured pelvis is certainly mentioned, but that is all. In fact the more interesting a question or a subject is the more likely is our author to ignore its claims. We cannot help suspecting him of underestimating the capacity and knowledge of his readers.

We should perhaps make an exception in favor of the section on fracture of the patella. A well-written and interesting narrative leads us up at last to the treatment by wiring. But, here again, the author stops short, and declines to give any description of this now famous operation, and yet he acknowledges it to be justifiable in certain old cases. With regard to recent cases, he thinks it enough to say that he would not have it done on himself, and therefore would not recommend it to others. Let us suppose his patient to be Hanlan, or Beach, or George, or Myers, or Archer, or any one of the hundreds of young men whose fame, fortune, or even livelihood depends on perfection of limb, how would these athletes like their surgeon to measure their needs by his own, viz: those of an upper-class gentleman in easy circumstances, living by head-work and hand-work? When we consider that the treatment recommended by Mr. Pick involves twelve months of straight position for the knee, and every probability of permanent wasting of the quadriceps extensor, we shall recognize that there must be thousands of persons, women as well as men, to whom it would be the height of the eccentric to test the matter by a standard suitable for a gentleman who can ride about in a carriage, and who never needs to kneel except at prayer time.

All our fault-finding can be summed up in the phrase we used at the commencement: compound and complicated fractures are not dealt with in anything like the completeness and detail they deserve. The defect is perfectly remediable, and Mr. Pick is excellently qualified to remedy it if he choses.

The name of Dr. Hector Cameron should be added to those mentioned in connection with fracture of the olecranon, at page 196.

The printing and general get-up of the book are charming. The illustrations are good, but might be more numerous.

Taking everything into consideration, this is a worthy addition to an admirable series.

C. B. KEETLEY.

III. HUNTERIAN LECTURES. Delivered before the Royal College of Surgeons, of England. June. 1885. By EDWARD LUND, F.R.C.S., Consulting Surgeon to the Manchester Royal Infirmary. London: J. & A. Churchill. 1886.

From a surgeon who has for so many years deservedly enjoyed the highest esteem as a practical teacher of anatomy and surgery, no apology was needed for choosing subjects for the Hunterian Lectures of "a general character," rather than offering "new matter."

The first lecture, which treats of injuries and diseases of the face and neck, specially directs attention to the desirability of using plenty of fine silken sutures for approximating the edges of a wound which implicates the depths of the skin and the fibers of muscles of expression. Allusion is made to the case of a boy who had deeply cut his face over the malar bone. The wound was carefully dressed with strips of plaster, but when the dressings were removed—on the third day—it was found that spasmodic contraction of the peripheral fibres of the orbicularis palpebrarum had drawn the upper flap of the wound away from its fellow, with the result that cicatrization was delayed and an unnecessarily large scar formed—"as often as I see this gentleman (for he is now grown up) the ill effects of my bad treatment become more apparent." The recognition of mistakes in the practice of others is not altogether an unpleasant way of acquiring knowledge; but the confession of our own error is the most certain way of improving. Instruction which is founded upon a record of one's own faults characterizes the strong teacher.

Throughout the Lectures, points of the greatest practical importance stand forth, and most of them will doubtless find a resting place within the pages of future Text Books and Manuals of Surgery, either with or without acknowledgement of their source—probably the latter.

There is one point to which we would specially call attention, that is, the manner of treating reducible inguinal hernia in the infant by a skein of worsted. We will not attempt here to describe it, but will refer the inquirer to page 48 of Mr. Lund's volume. We have tried this worsted truss and have been more than satisfied with it.

The second and third lectures treat of certain pathological conditions of the genito-urinary organs and of the rectum. In the treatment of internal piles small injections of alum lotion are spoken of as being of immense service.

Mr. Lund's style is so personal and attractive, that while studying these Lectures we have felt that we have been face to face with the illustrious author; and now, in closing the book, we venture to con-

gratulate him most heartily on the practical use which he made of his occupancy of the Hunterian Chair.

EDMUND OWEN.

IV. JAHRESBERICHT UBER DIE CHIRURGISCHE ABTHEILUNG DES SPITALS ZU BASEL WAHREND DES JAHRES 1884. Erstattet von Prof. Dr. A. SOCIN, Oberarzt und Dr. S. KESER Assistentarzt (Annual Report of the Surgical Division of the Basel Hospital for 1884). Basel: Buckdrückerei von Ferd Riehm. 1885. Pp. 168.

We were led to present a brief synopsis of this pamphlet, not so much because we thought that the records of the surgical division of the Basel hospital would possess any special interest for English readers, but because we were struck with the thorough and scholarly manner in which they were kept. If our own hospitals published such annual reports, a vast amount of valuable statistics would be preserved that are now hopelessly lost.

The first general tables present the ordinary details concerning the number, sex, age and place of birth of the patients, and the total number of days during which they were under treatment. Out of 715 patients we learn that the mortality was only 4.62%.

Following a carefully prepared table in which the cases are all grouped under the general headings, "wounds," "acute" and "chronic inflammations," "tumors" and "miscellaneous," are 140 pages in which are presented brief, but intelligent notes of every case, appended to which in the fatal cases are the appearances seen at the autopsy. These notes are arranged in the most systematic manner, so that they can be referred to without loss of time. Under a separate chapter on each region of the body are the sub-headings employed in the general table. For instance, the reader who is looking for tumors of the head, can refer at once to the chapter on the head, and then to the section on tumors; or, if information is desired regarding wounds in the neck, he can turn to the chapter on that region and find under it the section on wounds. In turning over the pages we note with interest the extended notes on tumors of the neck (pp. 29-43), thirty-three cases in all, most of which underwent operation with only three deaths; twenty-one of these were examples of strumous enlargements, and the operations were especially difficult. One case of successful gastro-enterostomie (after Wölfler) is reported at length (pp. 55-57). The cases of hernia are collected under exhaustive tables (pp. 60-71), the summary being as follows: Eighteen cases of strangulated hernia, of which ten were operated upon, three patients succumbing; seven of reducible hernia, six of which were cured by a radical operation. The

next table appears on pages 84-91, where fourteen cases of cancer of the breast are carefully reported; twelve patients underwent an operation and recovered without elevation of temperature. There were no deaths. Passing over the elaborate notes on the injuries and diseases of the extremities, we reach the concluding tables, which include "accidental traumatic affections" (pp. 153-155), under which are noted three cases of erysipelas that recovered under the use of antipyretics and stimulants with carbolic acid applications, two fatal cases of tetanus, one of which was developed before entrance, and two cases of delirium tremens that also recovered. On pages 156-160 are notes of the thirty fatal cases, and following these are tables showing the operations (344) and their results. The summary is: Cured, 282; not improved, 15; died, 20. A careful review of these tables will show that a large number of the operations were of a capital nature. Thus, of forty-one amputations and exarticulations (two at the hip-joint) only one died, while among thirty patients who submitted to resection of the various joints, only three succumbed (two cases being excision of the knee). There were only four deaths following the extirpation of sixty-nine tumors, and three of these were cases of malignant disease. The mortality falls mostly to the formidable or hopeless operations, viz: Œsophagotomy for carcinomatous stricture, 1; laparotomy for injury to, or incarceration of, the intestines, 2; laryngotracheotomy for diphtheria, 2. We have mentioned these facts simply to show that the mortality from *preventable* causes in the Basel hospital was almost *nil*. Not alone from the table of statistics, but from the methods of treatment as briefly set forth in notes of individual cases, we should infer that the interior arrangements of that institution and the manner in which its surgical department is managed are above reproach. We commend this report to those of our readers who take pleasure in studying figures which "do not lie."

H. C. COE.

- V.—1. PRACTICAL SURGERY. By J. EWING MEARS, M.D. Second edition. Philadelphia: P. Blakiston, Son & Co. 1885. 12 mo. Pp. 794.
2. MANUAL OF OPERATIVE SURGERY. By LEWIS A. STIMSON, B.A., M.D. Second edition. Philadelphia: Lea Brothers & Co. 1885. 12 mo. Pp. 506.
3. MANUAL OF THE PRINCIPLES AND PRACTICE OF OPERATIVE SURGERY. By STEPHEN SMITH, A.M., M.D. Boston: Houghton, Osgood & Company. 12 mo. Pp. 689.
4. AN INDEX OF SURGERY. By C. B. KEETLEY, F.R.C.S. Second edition. London: Smith, Elder & Co. 1884. 12 mo. Pp. 494.

The fact that these four volumes have successfully passed the ordeal of a first publication, and that in each case a second edition is demanded, may be taken as an illustration of the survival of the fittest. Demand, however, is not always a guarantee of merit. Consequently it is the more pleasing to be able to confirm the judgment of the surgical reading public, that there are elements of permanent utility and value in these books which make their revision and republication a source of congratulation.

A brief review of these works, outlining the fields which they respectively occupy, and indicating some points of dissimilarity may be of service to those who have not hitherto been familiar with their several merits.

The volume of which Dr. Mears is the author, was written in compliance with the request of students who desired a not too bulky treatise on the more practical part of surgery. Sections of the work are devoted to the consideration of surgical dressing, bandages, fractures, dislocations, ligature of arteries, amputations, and finally, excisions of bones and joints. Under the head of fractures we fail to find any mention of Mason's method of treating fracture of the nasal bones, especially when complicated with fracture of the nasal processes of the superior maxillæ and the nasal spine of the frontal bone, which consists, after replacing the fragments, in passing a strong needle transversely across the nose, through the line of fracture, leaving the ends of the needle projecting on either side. A strip of rubber tape is laid over the bridge of the nose and attached to the needle-ends, thus completing the arch and giving firm support to the fractured bones. It would seem to be preferable to the daily replacement of the fragments by sound or director, which is bloody and painful, not to speak of the better result as regards deformity.

Nor is any mention made of wire cloth, which makes a light, strong and serviceable splint. The use of the primary bandage in certain fractures, which is advocated, seems somewhat hazardous advice for students. It is surprising what a mass of valuable details there is in regard to the practical work of dressing and treating wounds and fractures. Indeed the same remark applies to the entire work. The section on ligation of arteries contains in brief shape excellent and commendable descriptions of the surgical anatomy of all the important vessels. The anatomical and clinical details of amputations are also well worked out. The author's endeavor to obtain conciseness without omitting any essential fact or detail, is thoroughly successful. It contains numerous illustrations of good quality.

Stimson's Manual of Operative Surgery is much broader in its scope than the preceding treatise. He not only considers ligation of arteries, amputations and excisions of bones and joints, but also describes neurotomy, tenotomy and plastic operations on the face. Moreover, nearly half the volume is devoted to special operations. These latter include operative work upon the eye, ear, mouth, pharynx, neck, thorax, abdominal viscera, genito-urinary organs of male and female, and miscellaneous operations. From this conspectus of its contents it will be seen that this manual covers a wide field, and considering the extent of the ground, the work is remarkably well done. The writer's plan of work is interesting, involving as it does not only a large amount of work, but also to a considerable extent, the element of personal judgment. He has not attempted to include every operation, or its modifications, but simply to select from a vast number those which have commended themselves to experience and reason. Where diametrically different methods exist, the endeavor has been made to indicate their respective merits and demerits. The modifications required by exceptional circumstances are also quite fully treated. Too much space would appear to be devoted to Wood's operation for the radical cure of hernia. Thirteen pages is a somewhat generous amount of room to be granted to a method so little practiced. Ogston's operation for genu valgum is described, and at the end it is stated that this operation has been superseded by transverse division of the shaft of the femur close above the condyles, but we do not find Macewen's name mentioned, nor any description of his universally adopted operation. The author has been decidedly happy in the execution of his plan, and has succeeded in producing a good and trustworthy hand-book of the more purely operative part of surgery. The illustrations are clear and well-selected.

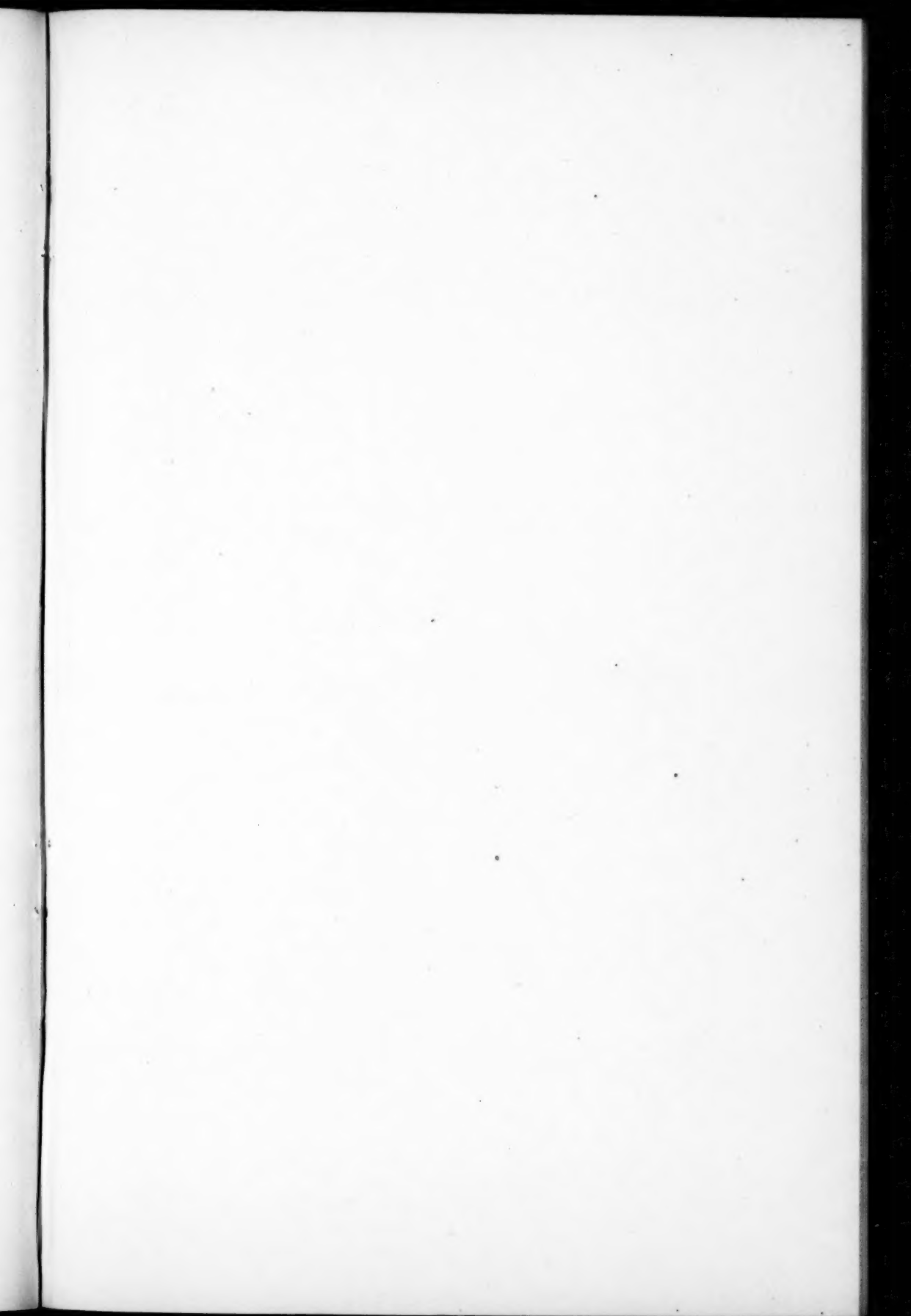
Operative Surgery, by Stephen Smith, was originally prepared with

special reference to military practice. Now, however, it includes the general operations of civil surgery. It differs from the preceding volume in not considering operative work on special organs, and from Mears' Surgery in being more comprehensive. Its aims and methods in some respects vary materially from either. It is not so much an expression of opinions derived from personal experience, nor does it involve the element of personal judgment to the same extent. Rather is it a very successful effort to embody the teachings of recognized authorities, on every subject, so far as the present standard of surgical practice will warrant. A distinction is made in the text, by larger and smaller type, between those facts and opinions which are confirmed by authority, and, on the other hand, speculations and modifications which at present are merely tentative. Scrupulous care is taken to give credit to whom credit is due, and as a result the pages bristle with marginal references. The obligations and necessary qualifications of the surgeon are fully but compactly stated. It embraces not a little on diseases and injuries of various parts of the body, which are not included in the plan of the two preceding works. It is certainly much more comprehensive in certain directions, but not more complete when the purposive limitations of the former are taken into account. It is fully illustrated, some of the plates not being remarkable for their artistic value. The concluding section on Deformities and Compensative Appliances is of decided interest and profit. The book is of approved value and stands in no need of further commendation.

The Index of Surgery, by Mr. Keetley, is another work for whose existence there is ample reason. Like Mears' work it is intended principally for students preparing for examination, but we shrewdly suspect that the practicing surgeon will not disdain its use. It is far beyond the average "Introduction" or "Hand-Book" in its breadth, its amount of information, and the large quantity of minute detail contained within its covers. In reality, as well as in intention, the book contains the main facts and theories of surgery, concisely stated, classified and arranged in alphabetical order, with all necessary cross-references. The great point of difference between this and the first edition, is that in the former it was endeavored to avoid the great question of antiseptic surgery. In other words the author tried to steer safely between the antiseptic and non-antiseptic surgeon. His success naturally was not brilliant. Therefore in the present revision of his work, he has hoisted the standard of strict antisepsis, and evidently feels much relieved thereby. It is certainly a great gain in the value and usefulness of the work. The necessary additions and revisions have been made to bring the text up to date. The plan of the work does not include illustrations.

The respective fields occupied by these works have been roughly indicated. Keetley's, perhaps, is more purely a text book for the student of the theory, as distinguished from the practical part, of surgery, than the others. Mears', perhaps, is of the most service in the earlier and everyday work of the student and young practitioner. Stimson's volume is of service in special operative work, and Smith's most useful as a full and complete conspectus of accepted opinion in reference to all operations of general surgery. Further comparison is fruitless where all are so valuable in their respective fields. In this day of a fecund medical press, to say that these volumes are worthy of republication, is manifestly a high compliment.

G. R. BUTLER.



ON LAPAROTOMY IN THE TREATMENT OF STRANGULATED HERNIA.

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THE principle of opening the abdominal cavity near the site of a strangulated hernia has lately attracted some attention. See, for example, papers, cases and letters in the journals by Messrs. Pye-Smith and Hurry Fenwick and a note in the *Medical Record* by Dr. Richard Neale. The first two gentlemen have given me credit for a little more than my due. I must not therefore complain of Dr. Neale for ignoring me altogether. As a zealous opponent of all false claims he does good service.

It is not, however, with a personal object that I wish to approach this matter. I think the time opportune for a more complete review of the whole subject than has hitherto appeared.

According to Mr. T. F. Chavasse, Mr. Crompton of Birmingham, opened the abdomen in the linea alba just above the hernial aperture of an umbilical hernia which had been strangulated acutely for seven hours. His intention was evidently to approach the seat of strangulation from its internal or abdominal aspect. But, finding the gut gangrenous, he desisted and laid the sac open. This occurred on September 7, 1860: Mr. Chavasse's paper appeared in the *Lancet* for May 27th, 1882.

At the Edinburgh Medico-Chirurgical Society on April 2, 1873, Mr. Annandale made a case of his the basis of a paper from which are taken the following quotations:

"My friend, Dr. Niven of Edinburgh has more than once talked to me of the advisability of this operation, but it was only on meeting with the present case that I felt justified in performing it."

"The cases which appear to me" writes Professor Annandale, "to be most suitable for this operation, are :

1. Umbilical Herniæ in the adult, especially if the coverings of the hernia are thin or ulcerated, or the hernia large.

2. Large inguinal or scrotal herniæ which have been recently reducible.

3. Herniæ in other regions in which, owing to special conditions, the usual operation cannot satisfactorily be performed."

"This operation is, however, only suggested when in those forms of herniæ the condition of strangulation or obstruction gives rise to symptoms which absolutely necessitate operative interference, and when signs of gangrene or a history of old standing irreducibility are absent."

Annandale further says: "The principle of this method consists in making a small incision through the abdominal wall and opening the abdominal cavity near the hernia, instead of cutting into the hernial sac itself, or exposing it. One or more fingers are then to be inserted into the abdominal cavity and the protruded structures contained in the hernial sac drawn back from within."

On July 3, 1878 ¹the Edinburgh professor was called to see a gentleman, æt. 65, in whom a strangulated right-inguinal hernia had been reduced "en masse." He made a three-inch incision in the linea alba, midway between the pubes and umbilicus.

"A portion of the small intestines dilated with gas immediately protruded, and on passing my finger along this in a direction towards the right iliac fossa, I felt that the gut was here caught and fixed in some way. This fixed portion was easily drawn toward the wound, and it was then seen to be a small knuckle of gut strangulated by the neck of a hernial sac. This sac was entire, and its neck lay in the general peritoneal

¹ See Edinburgh Medical Journal, February, 1879.

cavity, and had the appearance of being somewhat everted towards this cavity. Above the obstructed gut the intestine was dilated; below it, it was contracted and flaccid. Slight and careful traction on the intestine from within, and at the same time gentle pressure with one finger on the neck of the sac in the opposite direction, at once relieved the strangulated portion, and drew it out from the sac."

Strict antiseptic precautions were used. Unfortunately: "His friends—contrary to orders—allowed him to rise out of bed with their assistance, and to sit and strain on the night-stool." He died ten hours after operation.

A post-mortem examination showed slight peritonitis. The hernia, in this case, had been strangulated four days, and reduced "en bloc" during three of them. A fatal result would, therefore, have been likely enough under any form of treatment.

Annandale remarks: "When," after a reduction en bloc, "a distinct tumor can be felt, its exposure by incision is, no doubt, the best operation which can be performed, but if no tumor can be felt, then I think that a median abdominal incision, such as was practiced in my case, is to be preferred. *The ease with which a strangulated portion of gut is relieved when gentle traction is made upon it from within is remarkable*, and a median incision has the additional advantage that, by means of it, any complication, such as twisting or adhesion of the intestine, can be recognized and relieved much more readily than through an opening made in the inguinal or femoral regions." The italics are mine.

Coming now to my own connection with the subject of this paper, there are certain reasons why I should deal with it more minutely than would otherwise be justifiable. These reasons are: (1) that it has been misrepresented and misunderstood in such a way as to take unfairly from the credit due to others, and (2) that the subject itself appears to me in a somewhat different aspect from that in which it seems to be viewed by others.

On February 25, 1883, at the West London Hospital, I operated on a very fat, middle-aged woman, with a large and strangulated umbilical hernia, the contents of which I found it ex-

ceedingly difficult to reduce after the strangulation had been removed. I made, in *linea alba*, below the umbilicus, a hole large enough to admit my right fore-finger, and with this finger hooked and pulled the intestines from the hernial sac into the abdominal cavity, assisting with my left hand in the sac.

On November 2, of the same year, I read a paper on this and other cases of herniotomy, before the West London Medico-Chirurgical Society, and the following sentences occur in the abstract published at the same time in the *British Medical Journal*: "Sometimes after cutting the constricting edge, the surgeon found it a work of difficulty and slowness to reduce the swollen intestines. In the meantime hæmorrhage was very likely taking place into the peritoneal cavity. Within certain limits strict antiseptic precautions made this a matter of indifference. Beyond these limits it might become a serious matter. Hence, in such cases, Mr. Keetley suggested a second incision of the *linea alba* into the peritoneal cavity, just above the pubes, merely large enough to admit two fingers with the help of which the intestine could be pulled back into the abdomen. When the strangulation was known to be quite recent, it would be justifiable to attempt reduction by this proceeding alone, with no incision over the hernial aperture. It was so much more rational to attempt to *pull back* than to try to push back a soft and flexible loop through a tightly constricting hole. The same principle had long ago been applied to umbilical hernia by Crompton, of Birmingham, and more recently and successfully by Annandale and Chavasse."

In the interval between my own operation of February 25, and the date of the above paper I had seen Chavasse's paper, and learned from it all I knew of Crompton's, Annandale's and his own cases. I was consequently not aware of the existence of Professor Annandale's second paper, namely, that published in the *Edinburgh Medical Journal* of February 1879, nor of the fifty London surgeons who heard my paper read, does any one appear to have been better informed than myself. It is not surprising, therefore, that Prof. K. Macleod, Dr. J. Roche, Mr. Fenwick and Dr. Pye-Smith should have, in their papers, etc., published in 1885 showed a similar want of acquaintance with Professor Annandale's papers. The main conclusion I draw

from all this is a strong argument in favor of the *raison d'être* of the ANNALS OF SURGERY, which attempts to deal practically with the appalling vastness of modern surgical literature.

It will be plain, however, to any reader who has noted carefully what I have written so far, and still more, if he will take the trouble to read the original papers, of which the references are here given, that I performed what we will term "Crompton's and Annandale's operation" with entirely different intent and motive from those of my predecessors.

In his admirable work on "Operative Surgery in the Calcutta Medical Hospital," (p. 179), Professor Kenneth Macleod briefly notices a case for the full details of which he refers us to the *Indian Medical Gazette* for February, 1884. The patient, æt. 60, had a double scrotal hernia, irreducible on both sides and complicated with symptoms of strangulation of the left hernia of six days' duration.

"Right hernia hard, tender, without impulse; left loose. Laboring under double hydrocele. The hydrocele of the right side was tapped and emptied. Sac exposed and opened; contained large quantity of sanguineous serum, and four inches of congested and inflamed intestine; stricture outside of sac freely divided. The intestine was denuded of lymph and returned, *A finger was passed into the opposite sac and traction from within combined with taxis* failed to empty the sac. The left hydrocele was also tapped and emptied." The left rupture was returned by taxis seventeen days after operation. Dr. Macleod speaks of this "examination and traction of a hernia from within" as "a rare, if not unique, experience."

In a paper entitled, "Remarks on Hernia and Intestinal Obstruction," published in the *Dublin Medical Journal* for July, 1884, Dr. J. Roche, (of Kingstown, County Dublin), writes as follows:

"I venture to ask the profession to adopt a new system of operating in hernia.

"I propose that for umbilical hernia a vertical section should be made just outside the seat of tightness, and that for inguinal—oblique and direct, crural and obturator—the cut should be made above and almost parallel to Poupart's ligament that, in fact, the abnormal state of things should be combated *ex*

tergo instead of *ex fronte*." Dr. Roche also proposed that "if enlargement of the so-called stricture be found necessary" it shall be done with expanding forceps. The paper contains a discussion of the arguments for and against the procedure. The author had apparently never put the plan into practice.

In the *Lancet* for September 26, 1885, Mr. Hurry Fenwick contributed a paper entitled "Laparotomy as an Aid to Herniotomy." It is based on the case of a man, æt. 53, with strangulated left inguinal hernia. The history of this case should be read in detail. It is most instructive and suggestive. I have, however, only space to quote the following :

"The neck of the sac was then incised, but the contents of the bowel could not be emptied. The gut was therefore withdrawn from the sac under cover of lint steeped in carbolic lotion (1 to 19) and examined. The part which had been in the grasp of the neck was contracted, and of a milk-white color; there were no adhesions between the coils. An attempt was subsequently made to replace the gut piece by piece, but this also proved unsuccessful, for as soon as a few inches had been replaced they were shot out again. On carefully examining the abdominal aspect of the neck of the sac, the finger impinged against a tense elastic body, which was felt to be occluding the entire mouth of the sac, with the exception of a small part of the inner margin, to and through which the herniated bowel could be traced. I surmised this resilient body to be tensely inflated bowel adherent to the greater part of the ring. The weakened and ecchymosed bowel prohibited much pressure. Longer exposure would have been injurious. A two-inch median incision just above the pubes was therefore made, the carbolized left fore-finger introduced, and directed towards the neck of the sac. There was a slight hesitation in finding the inner margin of the opening of the ring, because the bowel seemed to be completely covering it. Finally the ring was recognized, the finger hooked under the gut, and the entire hernia rapidly and easily withdrawn into the abdomen."

This patient suffered from little or no shock, and for a time seemed to be doing well, but, on the 5th he had retention of urine and was catheterized. On the sixth day he died. The

autopsy explained the difficulty in reducing the intestine, but did not account for the death. Mr. Fenwick writes:

"I cannot account for the sudden and unexpected termination except on the supposition that it was one of rapid exhaustion. The unfortunately fatal issue should not, however, be allowed to weigh against an operation so simple, so effective, and, in these days of abdominal surgery, so safe. I do not believe a small peritoneal incision—presuming strict antisepsis to be observed—adds much to the risk of herniotomy. The rapidity and ease with which the gut was in this instance withdrawn past an unknown barrier, thus contrasting so markedly with the previous necessary manipulation of the gut, induce me to believe that it will find favor with the profession, and come to be a recognized adjuvant to herniotomy for those cases in which the condition and size of the loop of bowel prohibits pressure or forbids prolonged exposure."

Mr. Fenwick had no sooner published his paper than he received from a correspondent the references to Professor Annandale's two papers, and through Mr. Fenwick I was now for the first time made aware of the existence of the second paper, and was also induced to read the first for myself instead of taking its contents at second-hand. I have, in this review, endeavored to do justice to both, and to make amends for neglect in the past. I have never made any pretence to be the first person to hit upon the fundamental idea of the operation. I had discovered that I had been doubly anticipated before I ever published a word on the subject, and I have never omitted to mention the names of Crompton and Annandale in connection therewith. But it was only in the second paper, published five years after his first, and quite unknown to me until recently, that the latter notices "*the ease with which a strangulated portion of gut is relieved when gentle traction is made upon it from within.*" This, which was, apparently, a secondary after-observation with him, was the primary a priori consideration which led me to operate at all. My predecessors plainly intended to avoid opening the sac. In all my references to the subject except one, I have assumed the sac to be already open. Hence my idea has mainly been one of "Laparotomy as an *Aid* to Herniotomy," theirs, on the other

hand, one of "Laparotomy as a *substitute*" for Herniotomy.

I have already quoted Professor Annandale's views of the indications for laparotomy for the relief of strangulated hernia. My own may be summarized as follows:

1. When, in herniæ of any class, the constriction having been divided, very exceptional difficulty is met with in reducing the intestine. This indication more especially has force when hæmorrhage from the notch is persistent or severe. Putting aside this important consideration of the prevention of hæmorrhage into the abdominal cavity, this indication must be one of extreme rarity.

2. When the hernia has been quite recently strangulated and belongs to one of certain classes, namely:

- a.—Congenital hernia in the male.

- b.—Umbilical hernia?

In the first class of cases it is to be done as an aid to, and in the second as a substitute for herniotomy. Under no circumstances would I sanction division of the constriction from the abdominal aspect, nor can I imagine how any dilating forceps could be used to stretch the ring without injuring its contents.

I have excluded femoral hernia altogether from class 2, because, having regard to the intensely dangerous character of that affection, ¹I believe that the surgeon will do best for his patient by taking the opportunity to cut down upon and incise the sac. I have more reluctantly and not without doubts, excluded non-congenital inguinal in the male, and both congenital and non-congenital in the female, because the completion of herniotomy by excision of the sac, with ligature of its neck, forms so satisfactory an operation in these cases.

On the other hand I have included congenital hernia in the male, because all excising and ligaturing operations on this affection are extremely dangerous, and usually quite superfluous as regards the object of getting a radical cure. Dangerous as they are, they are not superfluous when a direct herniotomy with incision of constriction, etc., is done, because then they are called for in order to isolate the wound from the abdominal cavity. There is therefore here a strong argument in

¹ See British Medical Journal, December 5, 1885.

favor of letting alone the sac of a congenital hernia in the male, and of doing median laparotomy when such a case is seen in a state of recent strangulation.

The very fact of strangulation in such cases suggests a small hernial aperture and the prospect of success with mild means of obtaining radical cure ultimately.

With regard to umbilical hernia, I have indicated by an "?" a feeling that the indication for laparotomy in that class will generally be very doubtful. Frequently a positive contraindication will exist. When a large sac exists, palpably containing a vast mass of omentum, with probably a history of irreducibility for months or years, what is to be done? Every one will recognize the desirability of getting a radical cure in such cases, but is this a favorable time to try? I do not see how any one can give a positive answer of great value to such a question. Should the surgeon be content to perform a small median laparotomy and hook back into the abdominal cavity sufficient of the hernial contents to relieve the strangulation (perhaps a single small knuckle of bowel), leaving the omentum? Or should he set to work in more heroic fashion, reducing the bowel completely, cutting away omentum, sac and superfluous skin and sewing up the hernial aperture? I did the latter in the case already quoted, and the patient died. Chavasse did the former, and his patient lived. But many a patient has been operated on in the latter way and lived, and all the other cases in which had been followed a practice resembling, (but it is true, not identical with) Chavasse's plan, have perished. It seems to me that time and experience alone will show. And even they may not show the truth very rapidly or clearly. For, when patients die after herniotomy, *why* each case dies is usually hard to tell.

I could almost bring myself to believe that it would be justifiable for a surgeon to make the experiment of attempting the reduction, by median laparotomy, of every case of strangulation in his practice until he had accumulated material enough whereupon to draw conclusions of value. He might limit the experiment to cases in which the symptoms were of less than, say, twenty-four hours duration.

Lastly, a few words about the *technique* of the operation:

It is of prime importance in this, as in all analogous proceedings, to keep strictly in the median plane of the body. In order to avoid waste of time in securing and tying vessels and checking oozing, it is best to substitute scissors for the knife after the skin has been divided. Near the pubes the pyramidalis may require division from its attachment to fascia in the middle line. The recti can be separated without cutting. It is neither necessary nor desirable to go too near to the pubes. It is not desirable because the further away from the root of the penis the better from an antiseptic point of view. It is not necessary, because the fleshy parts of the abdominal wall being movable will permit the median aperture to be pressed towards the hernial ring.

Every one who substitutes scissors for the knife as often as he ought to must expect to receive a good deal of banter. One of my colleagues rallies me amiably on what he calls "Scissorian Sections." The scissors should not be sharp. If the patient be very fat the wound will have to be funnel-shaped in order to permit the finger to get well into the peritoneal cavity. There can be practically no objection to enlarging the opening and inserting two fingers instead of one, if necessary.

The wound should be sutured in layers, (1) the peritoneum, (2) the muscles, (3) the aponeurosis, both beneath and superficial to the recti if possible, (4) the skin. Neglect of this may result in a ventral hernia. The cat-gut should be of the best and thoroughly aseptic in this as in every other instance in which buried sutures are employed.

If peritonitis were discovered at the operation, the surgeon would probably take the opportunity of washing out the peritoneal cavity and passing a drainage tube through the wound into Douglas' pouch.

When it is remembered that since Crompton hit upon the idea of performing laparotomy for the relief of strangulated hernia, no less than four other surgeons have revived the plan, each ignorant at the time of the labors of his predecessors, it will be acknowledged that, should this paper do nothing more than extend the knowledge of and call general attention to the procedure, it will not have been written entirely in vain.

RESECTION OF THE LARGE INTESTINE FOR CARCINOMA.¹

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THE resection of a portion of an intestine for disease of its coats has been performed in Europe some thirty-one times, but it is believed that the following case, the first successful one in this country, is sufficiently unique to justify me in asking the attention of this Society to a brief consideration of the subject. The details are as follows:

In October of last year, 1885, the patient, a tall, fully developed man of fifty-four years, was admitted to my wards in the New York Hospital, for the treatment of what he considered bleeding piles. He gave the history, that for two years past he had had daily six to ten bloody and painful passages from the bowels. During the tenesmus induced by these, there was at times a considerable prolapse of the rectum. There was found, by digital exploration of the rectum, one or two small quiescent internal hemorrhoids, and in addition, at the distance of a finger's length, could be felt, obscurely, the lower surface of a hardened mass, which, under anæsthesia by ether, could, by bimanual examination, be outlined as an irregularly elongated mass, movable from one side of the belly to the other, and situated at the upper border of the pelvis. No pelvic or lumbar glands were found enlarged, nor was any visceral complication detected. The conclusion was arrived at, that it was tuberosc carcinoma of the upper end of the rectum, inaccessible to operative procedures by the anus, but removable by laparotomy.

¹ Read before the New York Surgical Society, January 27, 1886.

The condition of affairs and the risks attendant upon such an operation were laid before the patient, who was a man of unusual intelligence, and who, after deliberation, determined upon submitting to the operation. This was therefore done on October 22, under full antiseptic precautions, and in the operating room of the hospital devoted to abdominal sections.¹

The diet of the patient was restricted for forty-eight hours previously to semi-fluids such as milk, bread, and eggs. An enema induced defecation a few hours before the laparotomy, and the urine was passed just before the etherization. Under a carbolic spray (which, in certain operations involving the cavity of the abdomen or a joint, I still prefer), an incision four inches long was quickly made from one inch below the umbilicus downward, and the peritoneum reached, seized and lifted between two clamp forceps, opened, and divided to the full extent of the wound by straight scissors. The intestines, as was hoped, were undistended, and three fingers of the left hand were then carried into the peritoneal cavity, the tumor readily caught and drawn out of the belly wound after some depression of the abdominal walls, and surrounded by flat disinfected sponges. It was a knobbed mass four inches in length, and its upper edge reached nearly to the sigmoid flexure of the colon. Temporary ligatures of heavy, soft, sublimated silk were carried through the mesorectum above and below the mass, and the intestine, for a distance of five and a half inches, including the tumor, cut off, and removed after tying off the mesorectum by several ligatures of silk parallel to the bowels, dividing it as far from the latter as possible. In the stump thus made after extraction of the neoplasm, were seen two small enlarged glands; these were dug out, and a further portion of the mesorectum cut away after being duly ligated.

The important point as to whether a reunion of the divided intestine should be had, was decided negatively, and the creation of an artificial anus determined on for the reason that, though the cut ends could be easily apposed, yet, in spite of all the care that might be exercised, leakage would be apt to occur. Reichel found this had happened in thirty-one instances out of his 121 collected cases of intestinal resection; in thirteen of these it caused death, in the others, fecal fistulæ resulted.² Moreover, the junction would have to be made deep in the

¹ This is a small special room with the walls rounding into the ceiling, thickly painted, so that all the room and its few contents can be washed previously to an operation with first soft soap and water; secondly, with a solution of sublimate, $\frac{1}{1000}$; and then, thirdly, for two hours bathed with the fumes of burning sulphur.

² *Deutsche Zeitschr. für Chirurgie*, No. 19, 1884.

pelvis, some four and a half to five inches from the anus, where the safe suturing of the bowels was felt to be a matter of extreme doubtfulness.

This was fully verified when, after the above decision was acted upon, the inversion and closure of the lower end of the bowel were attempted. Great difficulty was encountered in placing the double row of serous sutures (Czerny-Lembert) after the preliminary suture of the mucous membrane, and a third row was required at the posterior part to effect a satisfactory dimpling in of the bowel. And lastly, the chance of local return of the growth influenced me in preferring the establishment of an artificial anus.

This was accordingly done by carrying the upper divided end of the gut into the superior angle of the wound and allowing it to protrude, so that the part encircled by the temporary ligature (which was then cut away and a few bleeding points secured) should be outside the peritoneal cavity, in the event of any ulceration from its transient constriction. It was there fastened by three or four sutures, and the abdominal wound, after a fresh inspection and testing by sponges had shown that the peritoneal toilet had been properly made, was closed by strong catgut sutures, first passed through the whole thickness of the belly wall, but not tied till afterward, then the peritoneum itself was brought together with a continued catgut suture, and lastly catgut was passed through the skin and muscle to the peritoneum. This method of closure has been found best to avoid the formation of mural abscesses, but does not entirely get rid of, I regret to say, the smaller stitch abscesses. A sublimated gauze dressing on which iodoform was dusted was applied to the wound, and over that a large mass of absorbent cotton and a firm body bandage.

From the time of the operation until the 27th October, (five days), the patient complained severely of pain on each side of the wound, with occasional hiccough, and during the last twenty-four hours increasing distention of the abdomen occurred. His pulse, however, ranged below 90, and the temperature was less than 100°. Two of the deep stitches were cut to ease the tension of the swelling and to relieve the commencing tympanites. An evacuation of the bowels was solicited by gently introducing through the artificial anus a soft rubber catheter and carrying in several ounces of warm water. No immediate effect resulted. He was therefore ordered the next morning to take two ounces of Hunyadi water.

On October 28, on removing the dressing, as his bowels had moved painlessly under the action of the cathartic, it was found that the wound

was open throughout its whole extent, and in the mass of feces filling it was seen a coil of small intestine. After carefully wiping away the feces it was perceived, fortunately for the patient, that adhesions existed sufficiently to shut off the general peritoneal cavity, which fact allowed thorough cleansing and washing of the bowel, and its reposition in place, when the wound was sewn up with three wire sutures passing down to, but not through, the peritoneum, the adhesion of which to the intestines beneath rendered this latter impracticable and unnecessary. No reaction followed this mishap. The patient's general condition steadily improved, with evacuations from the bowel once or twice a day, which, in spite of the impermeable dressings contrived, so frequently entered the wound as to preclude secondary union, and its healing proceeded by granulation to completion in about seven weeks, with a firm, unyielding scar.

From November 4 to 13: Though progressing favorably, he had occasional pain in the belly and slight temperature elevation, up to 101° at night, without sweating or chills, and very little pelvic tenderness. On November 14, I was informed that he had had during the previous night a fecal discharge from the anus. It had been thrown away by the nurse, but was reported as being of ordinary character and very soft. This was thought to have been mainly the contents of the rectum, left in at the time of the operation. On the 15th, considerable flatus was passed *per anum*, and on the 16th he discharged by the same orifice nearly a pint of dark brown fluid of a strongly fecal odor, greatly to his relief.

Speculation on the possible source of a fecal or flatulent discharge took several directions, two of which seemed probable. The first was, that during the last transfixion of the mesocolon by a doubly-threaded needle, the point of this instrument had suddenly struck and torn an adjacent loop of small intestine, quite through to the mucous membrane. The slit was promptly sewn up by several Lembert sutures. this might have given away and discharged itself per rectum.

The second possibility was this: It was noticed after the second slice of the mesocolon had been removed, that the triangularity of this tissue had not been preserved, and that the portion of the bowel leading from the proposed artificial anus, for three inches, had a somewhat scanty mesentery. Its truncation to avoid gangrene from a defective blood supply was discussed with my colleague, Dr. Bull, but on holding the meso-colon up to the light, the vessels going to it seemed to be large and numerous, and hence it was preserved entire. It was possible that a spot of gangrenous intestinal wall from this cause might thus

have allowed a fecal extravasation to be conducted externally by the disused rectum.

No further discharge took place until November 20, when two ounces of a thin, light brown, markedly purulent fluid were discharged *per anum*. On the introduction of the finger into the bowel the upper limit of it could not be felt, and a rubber drainage tube was thereupon passed in at least six inches, giving vent to three or four ounces of very fetid brownish pus. The tube was left *in situ* covered by sublimate gauze, and the next day, and daily thereafter, the abscess cavity was washed out through it, at first with a $\frac{1}{5000}$ sublimate solution, and then $\frac{1}{10000}$, and finally, with Hey's solution (sulph. zinc, gr. ij; spts. lavand. co., $\bar{3}\bar{j}$; aquæ, $\bar{3}\bar{j}$). This discharge ceased in about three weeks. The rectal tube was worn ten days without discomfort.

It was evident that the above hypotheses were all wrong. The abscess, I think, was formed from some hemorrhage or from the stump enclosed by the silk ligatures, which made a mass uncovered by peritoneum, nearly two inches long, by three-quarters broad. This had been dusted by powdered iodoform before the abdomen was closed, and on reflecting on the operation, even before the disclosure of the abscess, it was felt that it would have been wiser surgery, in similar circumstances, to have left in a drainage tube. During the evacuation of this purulent collection the patient complained sorely of a pain over his liver, and this was found to be enlarged. As the cessation of pus formation took place, the hepatic tenderness disappeared, though the increased dulness on percussion remained. Whether this signifies a secondary deposit in that organ, I cannot yet say, though I fear it may so culminate.

He left the hospital for his home, in Scranton, Pa., January 2, 1886, rapidly gaining in strength and flesh, and controlling the discharge from the artificial anus better by a simple plug of cotton or gauze secured by a strip of adhesive plaster, than by the many other expedients which were suggested, and in other cases successfully tried. The pathologist's report of the tumor pronounced it one of encephaloid cancer.

Remarks:—I have been able to collect thirty-five cases in which excision of a cancerous intestine has been resorted to, and in all save one (Schede's) the disease has involved the large intestine; in an additional case (Crédé's) the operation was abandoned, only a small piece being removed for microscopic examination. Of this number, it is to be noted that of the five cases¹ in which the operation was done during the ex-

¹ Thiersch, Gussenbauer, Schede, Guyon, Treves.

haustion attendant upon an acute obstruction of the bowel, all died from the shock of the operation, hence this condition is considered by Schede to contraindicate the operation. Of these thirty-three cases (for in one, No. 18, the result is unknown) there was a mortality of seventeen, or 51.5 per cent., only a little greater than that which results from resection of the large intestine from other causes,¹ and which is given in Maydl's recent article on the subject at 50 per cent. Aside from the shock, ten died within forty-eight hours; in a number of cases, the progress was complicated by the escape of feces, as shown at the autopsy (four died from peritonitis from this cause), or by the presence of an intestinal fistula. When the latter occurred in the course of an otherwise favorably progressing case, it, as a rule, closed later spontaneously. This escape of the intestinal contents was due either to a faulty suturing, or to the minute gangrene so apt to take place from slight unperceived stripping up of the mesocolic attachments. For the sutures, silk or catgut was used, and though, in the majority of cases the usual interrupted suturing of first the mucous membrane, and then the double rows of the peritoneum, known as the Czerny-Lembert suture, was resorted to, yet Schede, among others, recommends strongly the continued suture, one to the mucous membrane, and two to the serous coat (and, as he prefers, with sublimated gut), as amply sufficient, and, what is of more consequence in a prolonged operation such as this is, with the saving of one-half to three-quarters of an hour's time. This more careful closing of the opposed mucous membrane is also of service in preventing fecal extravasation between this and the muscular coat (Maydl).

With the possibility of such a mishap, after uniting the ends of the intestine, and especially in the case presented, where there is left much of an uncoverable subperitoneal surface, I would be strongly disposed to use hereafter, should an occasion offer itself, a glass or rubber drainage tube, to avert, if possible, the risk likely to arise. If it were, however, possible to

¹ In six resections, for two gangrenous herniæ, three prolapsed artificial anus, and one cicatricial stricture, there were three recoveries.—Maydl: *Beiträge zur Darmchirurgie*, Wien. med. Zeitung, 41, 42, 43, 1885.

keep the joined intestine after a resection outside the peritoneal cavity until union had taken place, the ideal would be fulfilled, and all risks from intestinal leakage would be obviated; but as this is difficult, from the kinking of the loop of bowel at the line of suture, and from its congestion by the constriction of the abdominal wound, Maydl has successfully carried out in his last cæcum extirpation, the suggestion¹ that the belly wound should be kept open after securing the peritoneum to the skin, and the united intestine held up to it by one or two loose sling sutures carried through the mesentery. The protrusion of intestinal coils was prevented by iodoform compresses placed in and over the wound until adhesions formed. This takes place rapidly and both in Maydl's case and in my own the unintentional similar treatment of the wound has shown the feasibility of the plan.

The variation in the site of the incision in the abdominal wall, to revert to the *technique* of the operation in its proper order, was not great; usually, it was made in the median line. In resections of the cæcum and sigmoid flexure, Maydl and Billroth incised either parallel to Poupart's ligament, or from the umbilicus to the same ligament, or to the outside of the rectus and low down. For tumors of other parts, the mobility of the intestine permitted the use of the usual laparotomy section. Great difficulty was a few times felt from the considerable distention of the bowel, above the tumor; but in nearly all these instances it was possible, either by traction alone, or by combined depression of the abdominal walls, to bring the tumor outside the peritoneal cavity, where sometimes it could be shut from the latter by a partial temporary closure of the abdominal incision, or by carefully placed flat warm sponges or compresses of iodoform gauze. Where practicable, it has been found better first to tie off the mesocolon in small sections, and divide it from its attachments to the diseased intestine, and then to remove the portion of bowel determined on. Gussenbauer preferred to divide the intestine below and between a

¹ Reichel is opposed to this method of treatment, and says the sutured intestine should be fully returned, and the wound closed without a drainage tube, which is superfluous, as is also the fixation of the sutured gut.

double ligature, and did not cut above the tumor until all the mesocolon was severed, but this plan has not been usually followed.

Whether the gut be divided prior to, or subsequent to the mesocolon, its ends have easiest, and most frequently, been secured by the various operators either by the fingers of an assistant, or by a not too tightly applied temporary ligature of silk, as in my own case, or what I judge the best so far, by tape-like strips of antiseptic gauze, such as have been applied by Billroth. Rydygier's clamp, which, it will be remembered, consists of two rods covered with rubber tubing, between which the intestine rests and is held compressed, by rubber bands encircling the ends of the rods, has been successfully used, but the clamp of Treves¹ has been abandoned by its author, in favor of Bishop's. The latter instrument is too complicated, and of all the mechanical contrivances for the purpose, I would give the preference to that of Dr. Abbe, of this city, of which a diagram is annexed (Fig. 1.)² The blades of this instrument are covered with several layers of flannel, instead of rubber tubing, and thus afford a surer hold, and the compressing power at the handles is effected by thin bands of rubber. It also readily allows of a change of position, and rapid elongation and shortening. In passing the temporary ligatures, a spot in the mesocolon devoid of vessels can often be chosen, and is to be preferred.

After the removal of the diseased mass, a careful search should be made in the severed mesocolon for diseased glands, which can usually be easily removed. The question which then comes into the mind of the surgeon is, whether a reunion of the divided ends of the intestine, or an artificial anus with both ends in the wound if practicable, should be made. This point has already been touched upon in the narration of the case which forms the basis of this paper. In most of the cases in which recurrence was noticed, it took place locally, either renewing the stenosis by the involvement of the bowel itself, or producing the same through pressure from a growth in the parts adjacent. This reproduction of the neoplasm was ob-

¹ See diagrams in Treves on Intestinal Obstruction, pp. 481, 482.

² Manufactured by W. T. Ford, New York.

served in two cases in the site of the artificial anus, and admitted of partial relief by stretching, etc. The objection raised, that by waiting to perform a subsequent resection of the intestine for the false anus created by the first operation, an additional risk is run, is not so weighty as it at first seems, since the investigation of Reichel shows that in thirty-seven resections of

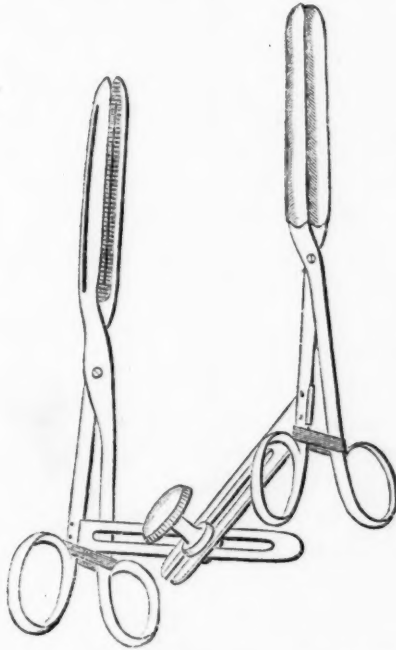


FIG. I. ABBE'S INTESTINAL CLAMP.

the intestine for the relief of an artificial anus, only two deaths resulted. The fact that in the eight cases where an anus was thus produced, death resulted in five, should not be interpreted that this plan of action is necessarily a more fatal one than is resection of the bowel, for not only are the cases too few to dogmatize upon, but also in more than half of these instances the anus was made because the parts removed had been so extensive as to render impossible the union of the divided ends of the bowel, and the operation itself thereby rendered more hazardous.

The conclusion already stated is, therefore, reiterated, that in an intestinal resection for a malignant neoplasm, it is wisest to establish an artificial anus.

Only a reference need be made in this connection to the lumbar incision for the removal of intestinal growths. This has only once been resorted to, with fatal result, by Lammiman, who, after taking away the tumor, brought out the lower end of the colon in the wound after placing a ligature around the lower end of the bowel, and dropped it in the abdominal cavity. Bryant's case, which preceded this, recovered. It was the result of the accidental opening of the colon in an ordinary colotomy immediately below the seat of the malignant stricture. This was detected and drawn out of the belly, and four inches cut off, and the two ends of the bowel fastened in the lumbar wound. I see but little to recommend in this procedure, as its scope must be confined to a very limited topographical region, though it has the endorsement of so excellent an authority as Treves.

A much more important consideration after all, is whether such hazardous operations are justified for the removal of malignant growths. In common with other surgeons, I feel the discouragement that attends endeavors to give relief, or to prolong life, and most remotely, to effect a cure in such conditions. The operation with which this more recent extirpation of abdominal growths has been compared, is lumbar colotomy, which is, however, merely a palliative one, and, according to the rich experience of Allingham, not effectual in prolonging life. Its risks, too, are, I think, made light of.

The large statistics of Erkelen,¹ embracing 262 cases of colotomy for all causes gave a mortality of 58.4 per cent., and for 110 cases of carcinoma 37.7 per cent. of deaths. The cases of recovery after resection of the intestine for a neoplasm, are too few to place with those of colotomy, and can only be fairly considered with the first cases of the allied operations of extirpation of the rectum and of the uterus by the vagina for cancer, both of which have now come, by increased experience, to have an acknowledged standing in surgery, and a diminished

¹ Archiv f. klin. Med., Bd. xxiii. Heft 1.

mortality from improved methods of operation, and judicious care in the selection of cases. To me, I confess, the fact that one can hope to have room enough in the intestine and mesentery to get wide of the tumor, is an advantage not possessed by any of the abdominal operations for malignant growths, except in ovariectomy, and in the belief that the dangers that come immediately from the operation can be more and more satisfactorily coped with, I venture to commend, in this brief paper, the resection of such intestinal tumors with, as a rule, the establishment of an artificial anus.

But a careful diagnosis must be made under ether to determine the mobility and freedom from adhesions of the growth, and the absence of pronounced glandular involvement. The interrogation of the organs, as, for example, the liver, in which secondary deposits are most likely to occur, should be strict, not only by palpation and percussion, but also by the newer corroborative chemical tests of urea diminution, and peptone increase, etc.

The operation should generally be begun as an exploratory one, with Tait's statement in mind, that it is harder to know when to desist than to go on. If the tumor is an unfit one for extirpation, an ordinary artificial anus can be made either in the exploration wound, or in the groin. This has been done, after Littre's plan, for carcinoma, in 23 cases, and has given a mortality of 39 per cent.²

I have appended a table comprising the collected cases. These are interesting in several points other than those touched on in the foregoing remarks. In respect to one—the recurrence, a few words may be added: in ten of these, where the fact of recurrence is noted, it took place in three cases (Czerny, Kraussold, Billroth) in less than one year; in 4 others (Reybard, Maydl, Volkmann, Bryant) between one and two years; and in one case (Fischer's) over two years, and in Gussenbauer-Martini's case the patient was free from disease at the date of our last report, four years after the operation. In Schede's, where a laparotomy was unsuccessfully done for intestinal ob-

¹ Archiv f. klin. Med., Bd. xxiii. Heft 1.

² Erkelen, op. cit.

struction, nine months after the resection and reunion of the intestine for cancer no trace of the recurrence of the neoplasm was found, and the interesting point was also developed that the turning inward of bowel by the Czerny-Lembert sutures had not given rise to any permanent projection into the lumen of the gut, only a simple linear cicatrix being perceived.

DISCUSSION.

Dr. Briddon remarked that notwithstanding Allingham's opinion, that colotomy does not prolong life, he had seen life prolonged and made much more comfortable by colotomy in cancer of the rectum, where the disease could not be entirely removed. He referred to a case of cylindrical epithelioma of the rectum in which, in the Presbyterian Hospital, he performed lumbo-colotomy, and the result was that the general condition of the patient was very much improved, and she was rendered very much more comfortable with reference to the local condition.

Dr. H. B. Sands agreed with Dr. Briddon in his protest against the view ascribed to Allingham, that life is not prolonged by colotomy performed for the relief of cancer of the colon or rectum. He did not know how this conclusion, drawn by Allingham, was arrived at, but he thought it was within the experience of most surgeons present that they had often succeeded in prolonging life by this operation. He could recall several instances in which at the time lumbo-colotomy was performed the patient was almost at death's door, and in which life was lengthened for a considerable period. He recalled the case of a patient in this city, in whom, at the time of the operation, there was complete obstruction of the bowel, accompanied with enormous distention of the abdomen, and Dr. Sands was sure that if mechanical relief had not been promptly afforded, he could not have survived more than three or four days. The patient had no bad symptoms after the operation, but recovered from it and lived more than a year afterward, being able, the greater part of the time, to go about and attend to business. He could recall other similar cases. He had presented to the Society a man upon whom he had performed inguinal colotomy, and who, at the time of the operation, was suffering from complete intestinal obstruction. Dr. Sands believed it could be stated as an established fact that, in a certain number of instances, the operation will not only relieve the urgent symptoms, but also prolong life for a considerable period.

Dr. Briddon said that the most gratifying case in this respect which

he had seen occurred about two or three years ago. It was one of acute intestinal obstruction due to malignant growth in the upper end of the rectum. He performed lumbo-colotomy, which gave the man complete relief, and he lived for two or three years in a very comfortable condition. The obstruction had existed eight or ten days when he first saw the patient, and the abdomen was largely distended.

Dr. L. A. Stimson said with reference to a collateral point—namely, whether it is advantageous ever to attempt to remove a cancerous tumor of the intestine, that according to the record which Dr. Weir had given, the longest period of survival had been five years. For the encouragement of those who should have opportunity to perform the same operation, he would say that seven and a half years ago he had removed a cancer of the rectum, and the patient, a physician, is still in active practice and good health; there has been no return of the disease.

Dr. Sands said that if it proved to be the result of further experience, that the operation of extirpation of a cancerous intestine can be done in such a manner as to reunite the ends of the intestine, it would still be a matter of doubt whether such an operation, which involves a greater risk than simple enterotomy or colotomy, should be preferred to the latter, for he could imagine that it would be found in cancer of the intestine, as in cancer of the stomach, that surgeons would rarely succeed in making such a radical operation as to give much chance against recurrence of the disease.

Dr. F. Lange said that he had had the opportunity to perform the operation twice; in both cases for malignant growth. In the first case the growth was situated in the ascending colon near the right flexure. It seemed to be very movable, and the patient was in a comparatively good condition. He expected to find conditions favorable for an easy operation, but was very much deceived, for the tumor was intimately adherent to the duodenum. The operation was accompanied by a great deal of hemorrhage, and finally by lesion of the duodenum, which he was obliged to close with suture. He did not, in consequence, have much hope of the success of the operation. The woman died on the second day, of peritonitis.

In the second case he had not intended to perform an operation on the intestine. The case was one of particular interest. The woman, about thirty-two years of age, and a widow, applied to him with reference to tumors which had developed comparatively rapidly, and which without much difficulty could be made out as belonging to the ovaries. Dr. Lange regarded the case as one of sarcoma of both ovaries, and

did not encourage an operation. The patient had had for the past two years obstinate bloody diarrhœa which could not be controlled effectually by internal remedies, and immediately before the appearance of the diarrhœa she had suffered from an attack of acute dysentery. By her attending physicians the diarrhœa was regarded as being due to the preceding dysentery.

The patient urged that an operation be performed because there were special reasons why she should desire to live a little longer. Dr. Lange, therefore, performed the operation for removal of the tumors, which were taken away without difficulty, but he found to his great surprise that, attached to one of these ovarian growths, indirectly through the omentum, was a large circular tumor of the transverse colon besides several nodules about the size of a hazelnut in the omentum, and there were also several enlarged mesenteric glands. As the patient was in a fairly good condition, and the operation thus far had not been prolonged, he determined to excise the intestine. The operation lasted about two hours and a half, and went on without much disturbance, and the patient came out of the operation in good condition. The first week was without trouble except that he was unable to check the diarrhœa. On the ninth day the patient died with acute symptoms of perforative peritonitis, which he thought was due to a suture giving way somewhere, in turn due to the incessant peristalsis of the intestine.

Dr. Lange presumed that in cases in which no complication exists the operation is very likely to be beneficial, and is one which will probably prolong life. He did not think that in all cases absolute rules could be stated. In scirrhus of the large intestines, which is movable and without complications, the operation is not more difficult or dangerous than exsection of the intestine for any other cause. The length of time for the operation under such circumstances, which can be performed without very much loss of blood, is not of great importance, if the operation is done with the necessary care and the patient's general condition altogether allows of such an undertaking.

TABLE OF RESECTIONS OF THE INTESTINE FOR MALIGNANT GROWTHS.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, etc., of abdominal wound.	Result.	Where reported.
1	Reybard, ¹ 1843.	Carcinoma of the sigmoid flexure.	3 inches.	Sutured and returned.	6 inches long above crest of ilium. Wound united by 3 sutures.	Recovery; 10th day movements from bowels. Recurrence 6 months later, and death 1 year after operation.	Bull. Acad. de Méd. t. ix. p. 1033.
2	Thiersch, ² 1875.	Carcinoma; acute obstruction.	Not stated.	Lembert's suture, intestine united and returned.	Linea alba.	Died in 12 hours, septic peritonitis.	Deutsche Gesellschaft. f. Chir., 1878, Bd. vii. S. 127.
3	Gussenbaur, Dec. 6, 1877. Man.	Carcinoma of colon; adherent also to small intestine; acute obstruction.	3 inches.	Ends united by Lembert and Gussenbaur suture; wound accidentally made in small intestine closed by 3 sutures.	Linea alba, and a second one transverse to this.	Died 15 hours after operation, from collapse.	Archiv f. klin. Chirurg., 1878, Bd. xxiii. S. 233.
4	Schede.	Carcinoma of descending colon.	None removed; disease found too extensive; intestine cut off.	Ends sutured. to wound as they could not be approximated.	Over tumor on left side.	Died in 24 hours from inanition; no peritonitis.	Deutsche Gesellschaft. f. Chir., 1878, S. 126.
5	Billroth, 1879. Woman, 60.	Carcinoma of descending colon at transverse flexure.	Not stated.	Enormous distention of bowels; artificial anus made, as it was impossible to unite ends, why not stated. Lower end closed and left in. To replace intestines incisions	—	Died in 24 hours.	Hauer, Zeitsch. f. Heilkunde, 1884, S. 83.

¹ The report of this case being made to the Academy of Medicine, it was referred to a committee made up of Blondin, A. Bérard, Jobert de Lamballe, to whom Reybard detailed his experiments upon dogs, previous to his operation. Seven dogs were operated upon by the commission, four surviving; but the committee sent in a report against the operative innovation of Reybard.

² In Thiersch's resection about a quart of fecal matter came out of distal end. When this appeared empty, he began to unite ends with Lembert's suture, and before he had finished a peristaltic movement forced a large amount of feces out, and a part entered abdominal cavity. He then made an artificial anus above the operation wound, allowing free exit to the feces, after which he finished suturing gut.

TABLE OF RESECTIONS OF THE INTESTINE FOR MALIGNANT GROWTHS.—Continued.

No.	Operation and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, etc., of abdominal wound.	Result.	Where reported.
6	Gussenbauer and Martin, Nov. 9, 1879.	Carcinoma of sigmoid flexure and meso-colon.	4 inches.	Lower end turned in on itself; sutured and returned to pelvis. Upper end made an artificial anus in superior end of wound.	Over tumor in left side of abdomen.	Recovered; in 2 months resumed work. Reported by Schede in 1883 as still free from disease.	Petit, Bull. Gén. de Thérap., t. ciii. 486, from Zeitschr. für Heilkunde, Bd. i. S. 208.
7	Guyon, Nov. 23, 1879.	Cylindrical epithelioma at juncture sigmoid flexure and rectum.	2 1-2 inches.	Ends united by 15 sutures, and bowel replaced.	Linea alba.	Movements followed immediately; died in 3 1-2 hours.	Petit, Bull. Gén. de Thérap., t. ciii. 537, from Peyrot, De l'intervention chirurgicale dans les obstructions de l'intestines.
8	Baum, Jan. 13, 1879.	Carcinoma of ascending colon. Fecal fistula made 8 weeks before operation above Poupart's ligament on right side in small intestine, to allow escape of gas, which prevented use of percussion and palpation.	8 inches.	End of upper intestine being longer than that of the lower, the former was made smaller after Billroth and Czerny's method, a wedge-shaped piece directed outward being made by 6 stitches. Ends then united with carbolized silk. Gussenbauer's sutures. Gut returned.	Incision 3 inches long over tumor, 1 inch below ribs 3 inches to right of median line. Supplementary incision 4 inches long from middle of first, running to right. Wound united with silk.	5th day soft movement; died 6th day; no peritonitis; sutures gave way.	Centralblatt für Chirurg., 1878, vol. vi. p. 169.
9	Krausold.	Carcinoma sigmoid flexure.	Not stated.	Sutured.	—————	Recovered; died 6 months later of recurrence in mesentery.	Sammlung klin. Vorträge, 191 S. 1724.

10	Kraussold, April, 1879.	Carcinoma ileocaecal valve, caecum, and vermiform process.		Joined by Lembert's sutures, silk.	As for ligation right external iliac.	Died of shock in 2 hours.	Centralblatt für Chirurg., 1881, vol. viii, p. 186.
11	Czerny, 1880.	Carcinoma of transverse colon and sigmoid flexure.	3 inches of sigmoid flexure, and 4 1-2 inches of transverse colon.	Cut ends of sigmoid united by 33 sutures, colon by 26.	4 1-3 inches long over tumor in left hypochondrium. United by deep and superficial sutures; drainage.	Recovered; movement 10th day after injection. Abdominal wound opened, but recurrence began and patient died at end 7 mos. 11 days.	Petit, from Berlin. Wochenschrift, 1880, 638.
12	Credé, 1880. Incomplete operation.	Carcinoma of intestine.		Only a portion of tumor removed for microscopic examination; it was found to have many foci.		Recovered.	Archiv f klin Chir., Bd. xx. S. 293.
13	Wittelshoefer, (Billroth), July 1, 1880.	Carcinoma of sigmoid flexure.	9 inches.	Lower turned in and sutured, upper sutured to upper end of wound.	To left of median line with convexity extended. Sutured from below up to artificial anus.	Died in 14 hours from general peritonitis and endocarditis.	Wiener med Woch., 1881. S. 1885.
14	Fischer, Feb. 24, 1881.	Carcinoma of descending colon.	Nearly 3 inches.	United by Czerny's suture, and then fixed by a suture to lower end of abdominal wound.	Linea alba, upper 3-4 closed, lower 1-4 left open.	Movement 1 hour after operation from rectum; 8th day feces voided from abdominal wound and fecal fistula formed here. Patient discharged on Oct 19 (8 months after operation), cured with no sinus. Since dead. (Schede, 1883). ¹	Centralblatt für Chirurg., 1881, Bd. viii. S. 794.

¹ Reichel, in Deutsche Zeitschrift für Chirurgie, No. 10, 1884, p. 261, reports that this patient presented herself at the clinic in Breslau, June 5, 1882, with recurrence at site of former fecal fistula. In removing this two coils of large intestine were found adherent to growth and to abdominal wall. It was thought unwise to resect these intestines, and after removing the recurrence in the abdominal wall, the wound was closed and united primarily. During October, November, and December, fecal fistulae and abscess formed between umbilicus and symphysis, and patient died January 9, 1883.

No.	Operator, and Date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, etc., of abdominal wound.	Result.	Where reported.
15	Bryant, Sept. 10, 1881.	Alveolar carcinoma of descending colon.	About 4 inches.	Upper end made into artificial anus; lower closed, and sewed to lower end wound.	For left lumbar colotomy; stricture found above wound thus made, and pulled down, excised; lower part closed; upper made into art. anus.	Recovery; movements during operation, Aug. 1882, doing well; there had appeared recurrence at opening a year later, which demanded stretching.	Medico-Chir. Trans vol. lxx, p. 131.
16	Nicolaysen, March 1, 1881. Woman, 49.	Carcinoma, sigmoid flexure prolapsed beyond anus.		While protruding beyond anus it was removed with its mesentery.	Removed per rectum.	Recovery; 2 1-2 months later reported well.	Nord. Med. Ark. iv. No. 13, 1882, Copenhagen, Med. Chir., No 36, 1882.
17	Von Wahl, 1882? Woman, 26.	Colon adherent to cancer of ovary and infiltrated with neoplasm.	4 inches.	Colon sutured together, Gussenbauer, Lembert; clamp to hold end intestine.		Recovery; though recurrence took place in a month.	London Med. Record, April 15, 1883.
18	Bergmann, 1882. Man, 40-50.	Carcinoma cæcum.	?	Cæcum and small intestine sutured together.	Median incision.	?	Oral communication from Dr. E. M. Culver, who witnessed the operation.
19	Billroth, Aug. 20, 1881. Man, 56.	Carcinoma cæcum.	Cæcum and part of ileum.	Colon reduced in size by 11 "occlusive" sutures, and then united to small intestine by 11 Wölfler and 19 Lembert sutures.	From umbilicus to middle of Poupart's ligament.	6th day stercoraceous vomitings; wound opened; cause not found; artificial anus then made. Died; no autopsy.	Hauer, Zeitschr. f. Heilkunde, 1884, S. 83.
20	Billroth, Oct. 18, 1881. Woman, 29.	Carcinoma both ovaries, involving intestine and bladder, both of which were resected.	5 inches.	Ends united by 5 Wölfler and 9 Lembert sutures and replaced; gut held by assistants.	Median line.	Recovered; bowels moved on 10th day.	

21	Marshall, April 15, 1882.	Carcinoma descending colon.	3 1-2 inches.	Lower end cleaned with solution of zinc chloride, and sutured to skin around by silk sutures through serous and muscular layers; all gut sutures through all coats; lower end ligated with gut and fastened in wound.	Wound in median line closed with silk; lateral anus; first incision made in median line just below umbilicus to pubes; supplementary incision 3 inches long, parallel to last rib of left side, 1-2 in. above crest of ilium.	Movement during operation. Died 3d day, diffuse suppuration.	Lancet, 1882, p. 721.
22	Volkmann.	Carcinoma upper part sigmoid flexure.	4 inches.	Artificial anus made: both ends brought into wound.	?	Recovery; reported in 1884 as dead from a recurrence of cancer 1 1-2 year after operation.	Centralblatt f. Chir., No. 19, 1883.
23	Maydl, April 1, 1883. Man, 54.	Cancer caecum.	Caecum and small intestine removed, 7 inches in all.	Artificial anus made, and 6 months later closed by pulling intestine after a further resection of 2 inches.	Outside of rectus; drainage after resection of fecal fistula, which slowly contracted but did not heal.	Recovered, though since dead from recurrence 1 year later.	Wiener med. Presse, April, 1883.
24	Czerny.	Carcinoma caecum and part of duodenum.				Died.	Centralblatt f. Chir., No. 35, 1883.
25	Schede, June, 1883. Man, 56.	Carcinoma of small intestine, attached to abdominal walls, tumor size of man's fist.	8 inches, mesenteric glands also removed.	Temporary ligature, ends united by single mucous and double row of serous sutures, all continuous and of sublimated catgut.	Median laparotomy.	Recovered; movement from 1st day; nine months later intestinal obstruction from a band; laparotomy; death; no recurrence found.	Beilage zum Centralblatt f. Chir., 1883, p. 66.
26	Partsch, July 14, 1883	Carcinoma of small intestine.	3 1-2 inches.	Sutured with silk passing through serous and muscular coats to middle of wound; ligature left about lower end of gut when stitched to wound.	From umbilicus to symphysis closed, except for 2 inches in centre, where peritoneum was sutured to edge of wound, and both ends of gut were se-	During operation movements carefully kept from abdominal cavity; doing well on 4th day, except delirium, in which patient jumped out of bed and	Centralblatt f. Chir., 1883, No. 52, S. 833.

TABLE OF RESECTIONS OF THE INTESTINE FOR MALIGNANT GROWTHS.—Continued.

No.	Operator, and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, etc., of abdominal wound.	Result.	Where reported.
					cured.	tried to escape; death 5th day, exhaustion.	
27	Lamminan, Feb. 14, 1883.	Scirrhous carcinoma of descending colon.	Not stated.	Upper end sutured to wound; lower end ligated with carbolized silk; gut returned to cavity.	As for left lumbar colotomy; closed to artificial anus.	Died in 48 hours from exhaustion; movement in a few hours.	Lancet, 1883, Aug. 4, p. 182.
28	Treves.	Cylindrical epithelioma of descending colon.	Not stated.	Ends united by 25 Lembert sutures, not including serous membranes; Chinese twist silk; divides mesentery from the gut.	Median line.	Died in 12 hours without stool, from shock and exhaustion.	Med. Chir. Tr., 1883, vol. lvi, p. 55.
29	Billroth, Jan. 26, 1883. Woman, 56.	Carcinoma of transverse colon.	6 inches.	9 inner and 27 Lembert sutures; tumor adherent to anterior abdominal wall.	Drain used.	7th, fecal fistula developed, which closed on 14th day; recovered; reported herself well 10 months later.	Hauer, Zeitschr. f. Heilkunde, 1883, S. 83.
30	Billroth, March 23, 1884. Man, 55.	Carcinoma of cæcum size of apple.	2 3/4 inches of colon, 1 1/2 inches small intestine excised, after tying intestine temporarily with broad strips iodoform gauze.	Ends joined with 22 sutures.	6 inches long, just outside right linea alba; drain used for 5 days.	Recovered; 6th day bowels moved.	
31	Sydney Jones, May 23, 1884.	Scirrhous carcinoma of ascending and transverse colon.	Not stated.	14 silk sutures through whole thickness of gut joining ends; "others" through serous coat alone, one fastening serous coat to abdominal wall.	Over tumor 5 inches; vertical direction; closed, except in centre; here packed with gauze (iodoform).	Died 3d day. No movement; exhaustion; no peritonitis, but "dirty looking pus had infiltrated tissues" at juncture of mesentery and gut.	Lancet, Jan. 10, 1885, p. 60.

32	Hofmöl, April, 1885. Woman, 24.	Malignant adenosarcoma of cæcum.	9 1-2 inches, ends secured with 3 rows sutured; drained.	Curved 5 inches from rectus, exposing tumor.		Recovery; movements 5th day.	Anzeige der k. k. Gesellschaft der Aerzte in Wien, May 1, 1885.
33	Lange, 1885.	Carcinoma of flexure and ascending colon.	4 inches.	Ends united with difficulty; duodenum wounded and sewn up.		Died 2d day.	Oral communication in discussion on this paper.
34	Lange, 1885. Woman, 32.	Sarcoma of transverse colon, with sarcoma of both ovaries.	6 inches.	Ends sutured by Czerny-Lembert method.	Median.	Died 9th day from perforative peritonitis; diarrhoea persisting from time of operation.	do.
35	Weir, Oct. 22, 1885. Man, 54.	Carcinoma of sigmoid flexure, lower end.	5 1-2 inches.	Temporary ligatures; artificial anus made; rectal end closed.	4 inches; median.	Recovery; left hospital Jan. 3, 1886, gaining flesh and strength; recurrence probable.	This paper

REPORT OF A CASE OF AMPUTATION THROUGH
THE LEG, WITH RECOVERY, IN A MAN
EIGHTY-THREE YEARS OF AGE.¹

REPORT OF A CASE OF EXPLORATORY OPERA-
TION ON THE CERVICAL VERTEBRÆ FOR
RELIEF OF PARAPLEGIA OF
TRAUMATIC ORIGIN.

By ROBERT T. MORRIS, M.D.,

OF NEW YORK.

CASE I.—*Amputation through the Leg, with Recovery, in a Man,
æt. 83 years and 4 months.*

In November, 1885, Dr. D. White, of Ithaca, N. Y., asked me to see the following case with him:

On account of a previous satisfactory experience in obtaining primary union in the wounds of elderly patients I decided—with some trepidation—to perform the operation described; and to stake all of the patient's chances on a scientific method of wound treatment. History—Mr. J. Van R. S., æt. 83 years and 4 months. Patient has been a strong man physically, but has been declining for many years. He has always lived well, but temperately. One year ago senile gangrene appeared over the metatarso-phalangeal articulation of the right hallux. There is no history of cause for diseased arteries, other than the history of senility. The gangrene progressed slowly until all of the toes of the right foot, with the exception of the little toe, had dropped off, and the exposed tissues showed hardly any signs of attempt at repair. Chronic cellulitis of the whole foot accompanied the gangrenous process in the toes, and persisted in spite of treatment.

Examination—Mental powers fairly well preserved. Vital organs in

¹ Read before the Surgical Section of the N. Y. Academy of Medicine, April 12, 1886.

good condition. All arteries of the right side of the body which can be felt are extremely hard and inelastic. All arteries of the left side of the body which can be felt are soft and apparently in a normal condition. Muscles flabby. Distal extremities of the first, second, third and fourth metatarsal bones of the right foot exposed, and projecting as blackened knobs. No granulations on exposed soft tissues. Whole foot, and tissues about the ankle, much swollen. Skin of foot and ankle dusky in color.

Operation—Assisted by Drs. White, Smith, Morgan (senior), and DeLano, I proceeded to operate with observance of technical antiseptic details. Dr. Smith controlled hæmorrhage by making pressure on the femoral artery with his thumb, as I did not dare use the tourniquet or Esmarch's bandage on account of the condition of the blood vessels. The patient took ether kindly. At the junction of the lower and middle thirds of the leg short side flaps were dissected up quickly, and the bones sawn in two. The three large arteries were so calcified that the lumen of each was nearly occluded, and collateral circulation had been established through smaller arteries in the vicinity. It was necessary to crush the ends of the large arteries with strong forceps, as ligatures would not constrict them at all until this had been done. The cut blood-vessels were all ligated with No. 7 cat-gut, prepared according to Kocher's method. Only a trifling amount of blood was lost.

I am not in the habit of waiting for "glazing" to take place when using bichloride of mercury in solution as an irrigating fluid, and the flaps were at once sutured neatly together with interrupted sutures of No. 7 catgut. No arrangement was made for drainage—with the exception of leaving out a suture at the lower angle of the wound; and care was taken to adjust skin margins closely at that point. The dressing consisted of a narrow strip of Lister protective, iodoform, and borated cotton¹.

After the operation the patient rallied promptly. There was no febrile reaction at any time afterward, and with the exception of a slightly increased pulse rate for a day or so, the vital signs remained normal. The patient "hardly missed a meal" after the operation.

The first dressing was allowed to remain untouched for fifteen days, and when at the end of that time it was removed and the wound was found to be healed by primary union "with the exception of two little

¹ I had neglected to take bichloride gauze or cotton with me; expecting to find these materials at Ithaca.

points of the skin" which closed shortly afterward. There was no formation of pus at any time, and the dressing was "neat and sweet;" containing only the usual small amount of transparent lymph-like discharge which follows an antiseptic operation.

In a letter recently received I learn that the patient walks about with two canes and a false leg (peg-leg)—that his health is very good indeed—that he eats and sleeps well—and that to all appearances he has a new lease of life.

CASE II.—Exploratory Operation on Cervical Vertebrae for Relief of Paraplegia of Traumatic Origin.

Mr. Frank S., of Elizabeth, N. J. History—Patient was 27 years of age at date of injury.

On March 11, 1883, while leaping over the shoulders of a friend, in play, he fell and struck upon his head. Paraplegia resulted—with loss of sensation and of motion at nearly all points below the neck. The patient was treated shortly afterward, but accurate notes were not made by the physician who was in attendance. From the parents and from the patient I learn that cystitis, bed sores and high temperatures made trouble for several months, and that during this time the treatment was extremely varied in character. Galvanism and faradism had been employed for awakening the paralyzed portions of the body, and various means resorted to for controlling disturbances of the viscera. A portion of the skin of the right arm which is supplied by a branch of the musculo-spiral nerve retained sensation for several weeks; but sensation suddenly ceased at that point after the application of an unusually strong faradic current.

I first saw the case eleven months after the date of the injury. The patient was quite well nourished, and the bed sores had healed completely. A chronic cystitis remained. The skin of the neck and of the upper portion of the thorax was hyperæsthetic, but lower down, sensation in the skin was entirely wanting. Sharp pains occasionally ran along the course of the right sciatic nerve, and the patient complained greatly of cramping pains in the right hallux. The muscles of the head and neck were in a normal condition so far as I could discern. The biceps muscles supplied by the musculo-cutaneous nerves, and the deltoid muscles supplied by the circumflex nerves, acted by volition; but all of the muscles supplied by the lower nerves were paralyzed. The skin over the biceps, and over the larger portion of the deltoid muscles was anæsthetic. The sphincter muscles of the bladder and rectum served to retain the contents of the two viscera to a certain extent.

Electricity had been employed irregularly, and not according to any method, about the extremities ; but the muscles of the extremities—excepting the intrinsic muscles of the hands and feet—were quite plump and firm. The plump muscles responded well to faradic excitation, but the atrophied muscles of the trunk refused to show contraction of their fibres.

Treatment was directed toward development of the muscles which had become atrophied. Galvanism was employed until contraction could be observed in any particular muscle or group of muscles, and then stimulation was continued with the faradic current.

The frequent exacerbations of cystitis were controlled fairly well with boric acid given internally, but some indigestion was caused by the drug. The details of the general treatment were left to the care of the parents who had studied the case well.

On account of the distance at which the patient lived from New York, I have not been able to make as many minute observations as I should otherwise have made, but points noted during the year following the time of my first examination may be summed up as follows: Skin of head, neck and upper portion of chest, of normal color. Sudoriferous glands there abnormally active.

Skin of other portions of the body is generally pale in color, and very dry, but occasionally it is reddish and moist. Hairs of skin of natural length and color. Growth of nails apparently not disturbed.

Muscles of head and neck and deltoid and biceps muscles of arms are plump and firm, contracting by volition.

Muscles of trunk and limbs in good condition, (pectorals, glutei and muscles attached to spinal column posteriorly are restored from condition of atrophy and non-contractility.

Not contracting by volition, but responsive to electric stimulus.

Muscles of thenar eminences, and the short extensors of the toes restored from condition of atrophy and non-contractility. Other muscles of hands and feet atrophied, and apparently not excitable.

Diaphragm contracting normally, but rather laboriously.

Sphincter muscles of bladder and rectum weakly contracted.

Iris contracts and expands readily, but the pupil seems to be constantly smaller than it should be with any given quantity of light.

Heart in normal physical condition, but accelerated rate of contraction on slight provocation.

Lungs expand by virtue of diaphragmatic action, so that respiration seems to be wholly abdominal.

I cannot prove that the accessory muscles of respiration are ever called into use as such in this patient.

Rate of respiration nearly normal, I think, but slight disturbance increases the number of inspirations markedly.

Stomach and intestines show no disturbances worthy of mention, as far as their part in the work of digestion is concerned. The contents of the rectum cannot be expelled by the patient, and accumulations there are washed away with a syringe at intervals of about forty-eight hours. The patient knows when the rectum should be emptied, but he cannot explain the character of the sensation.

Bladder contracted so that it will hold only three or four ounces of urine at a time. Walls of bladder corrugated, and covered with small concretions. The patient knows when his bladder is full, and a small drink of beer affects the urinary apparatus so quickly that he asks to have his bladder emptied almost immediately afterward. There is no voluntary control over the organ.

Attacks of cystitis have occurred at frequent intervals since the time of the injury to the neck.

Liver of normal size. Hepatitis(?) has occurred several times, and has caused pain and discomfort in the liver region. Stools at such times decolorized.

Spleen enlarged to a decided degree. (Patient lives in a malarial region, and gives a history of malarial poisoning.)

Kidneys give evidence of chronic nephritis, but the character of the nephritis is undetermined.

Brain evidently not disturbed. Patient has shown no signs of cerebral trouble, and he is bright and intelligent in conversation.

Nerves of special sense, with exception of the optic nerve, are in a normal condition. The optic disc and the retina look natural, but the patient complains that he cannot read for any length of time without tiring his eyes.

Nerves of sensation and of motion, have been referred to elsewhere.

The sympathetic system shows little more than what has been mentioned. It may be worthy of remark, that the skin of the paralyzed body reddens in response to irritation, and during febrile states. The color appears in flecks and blotches, and gives the skin a peculiar marbled appearance.

The patient's urine is alkaline and of normal specific gravity, and it contains sometimes twenty per cent. of albumen by volume. It contains also large quantities of phosphates, pus cells, granular, epithelial, fatty, and blood casts, decomposing bladder epithelium, and swarms of bacteria.

All of the joints of the patient's extremities are in a condition of

partial ankylosis, although the large joints admit of rather free passive movement in a limited range.

The spinal column shows no external sign of injury, and guided by inspection or by the sense of touch one would not know that the vertebræ had suffered any injury.

Judging from the fact that the arc of voluntary motion was complete through a portion of the brachial plexus, and judging from the character of the reflexes below that point, I made a diagnosis of fracture of the body of the sixth cervical vertebra with crushing of a corresponding section of spinal cord. I believed that with the exception of ascending and descending degeneration of the lateral columns the cord remained in good condition, and that it served in its function as a centre of reflection.

Whether or not any re-communication could be established between the cord and the brain—if a narrow crushed portion of cord were excised, and the good ends sutured together—was a question which had never been answered.

Believing that my wound would heal by primary union I thought it worth while to make an attempt to excise the damaged portion of the cord—(removing one or two of the cervical vertebræ if necessary.)

Regeneration of degenerated lateral columns if not to be expected was at least thought to be possible.

The patient was promised nothing. He and his parents considering the case as a whole agreed that an operation, though wholly experimental, was worth the undertaking. Imagine yourself in the patient's place—a living head—a dead body.

On June 12th, 1885, assisted by Drs. F. C. Fuller, Wm. B. Clark, C. L. Bagg and O. Abruzzo of New York, I proceeded to operate. Scientific antiseptic precautions were observed.

The first incision extended along the tips of the spinous processes from the fourth cervical to the fourth dorsal vertebra, and the scalpel was then carried down to the laminæ on either side, and the muscular and ligamentous tissues cut through in a line parallel to the row of spinous processes.

I had found on rehearsing the operation at the dead house that this very large wound was needed in order to obtain room for further work.

Strong retractors held the muscular tissues aside, and with a raspatory the periosteum was separated from the laminæ of the seventh cervical vertebra.

Other operators have found difficulty in using Hey's saw, but it seemed to be just the thing in this particular case; and with a little aid

from cutting forceps I found no difficulty in removing the laminae and spinous process of this vertebra. The spinous process of the sixth cervical vertebra was next removed, and sufficient room given for examination.

The membranes of the cord were found to be united in one dense fibrous mass and firmly attached to the bony tissues in the vicinity. On cutting through the tense and bulging membranes a very large quantity of clear, yellowish cephalo-rachidian fluid escaped.

The spinal cord was flattened and hardly thicker than a sheet of ordinary blotting paper. It was dull reddish gray in color, and fibrous in texture. A very few glistening healthy fibres were to be seen, and these fibres stood out in pretty contrast, like a new spider's web along a decaying twig.

The posterior surfaces of the bodies of the sixth and seventh cervical vertebrae seemed to be of normal height and breadth, but felt irregular through the thickened membranes. The right lamina of the seventh vertebra was thickened at one point so that it encroached upon the spinal canal.

As far as examination with the probe could be made,¹ the spinal cord was found to be degenerated, and it is a question whether the cord below the point of injury has not degenerated in its entirety and given its business over to the care of the sympathetic system.

Probably at the time of the accident the bodies of the sixth and seventh cervical vertebrae were either crushed or torn apart, the laminae or transverse processes or articular processes fractured, and the cord contused at a point opposite the bodies of the vertebrae. Reposition of fragments of bone followed; but the cord cut off from communication with the brain rapidly fell into a condition of atrophy.

My wound was closed with cat-gut prepared according to Kocher's method, after complete hæmostasis had been obtained in the wound with the same material. Two or three strands of silk worm gut were used to relieve tension at the line of sutures, and two decalcified bone drainage tubes were employed.

The patient rallied quickly from the operation, but nephritis and cystitis made him uncomfortable for several days. The antiseptic dressing which I had applied was not touched until two weeks after the operation. At that time it was found that with the exception of the lower drainage tube sinus the wound had healed by primary union without the formation of a single drop of pus. The drainage tubes and cat-gut had been completely absorbed. The small drainage tube opening filled with granulations and closed slowly afterward.

¹ The extent of the injury was so great that exsection was out of the question.

The history of the case after the operation is briefly as follows: On the day after the operation the patient appreciated the sensation of heat when hot bottles were placed at his feet, and at various times afterward this peculiar burning sensation appeared when the bottles were not in use.

The sciatic pains and cramping pains of the right hallux¹ slowly increased in frequency and at the time of present writing cause so much trouble that the patient has asked me to exsect a portion of the sciatic nerve.

About one month after the operation the patient complained of pains running down the arms to the hands, and at about the same date a new reflex was noticed—contraction of the psoas and iliacus and adductor muscles of the right leg, whenever the bowels were washed out.

The use of electricity was gradually abandoned in the case, and since then the paralyzed muscles which were plump have become lax, and the deltoid and biceps muscles contract very feebly by volition. Bed sores have again appeared over the sacrum, and they show no attempt at repair. The patient is mentally as bright as ever.

Death took place April 14, 1886.²

An autopsy was made on Friday, April 16, from 2 to 5:30 p. m. about forty-five hours after death. The examination was conducted by Dr. J. S. Thacher of the Pathological Laboratory of the New York Polyclinic, by whom the following report is furnished:

REPORT OF AUTOPSY.—The body was extremely emaciated. There was a large bed-sore over the sacrum, and there were smaller ones on the heels, the back of the knees, and over the angles of some of the ribs. The back of the trunk was red from the post-mortem settling of the blood, but of a lighter hue than is usual.

The heart was of a pale color, but of normal size. The papillary muscles and columnæ carneæ were mottled with pale yellow. The mitral valve was a little thickened, but not rough or rigid, and the orifice was of normal size. The other valves were normal. There were a few atheromatous spots in the first part of the arch of the aorta, and in the abdominal aorta.

The lungs were very pale and very dry, the bronchi contained some muco-pus.

The liver was of normal size, pale and soft.

The spleen was of about twice the normal size, and very soft.

The stomach and intestines were not opened. Nothing abnormal was to be seen on their outer surfaces.

¹ Probably of central origin, and not to be relieved by operation.

² Several weeks after the above history was written.

The left kidney was normal in size. The capsule was slightly adherent. The surface of the kidney was smooth, with the exception of several dark colored depressions of a cicatricial appearance. These spots were seen on section to be pyramidal, their bases at the surface. In the other part of the cortex the markings were not distinct. The pelvis of the kidney was slightly enlarged, and contained, besides a little thin purulent fluid, a number of gritty particles, a few small calculi and one large one of the size of a large bean. The ureter was somewhat dilated.

The right kidney was a half larger than the left, the capsule slightly adherent, the surface smooth. On the surface were seen several yellow spots, from the size of a pea to that of a chestnut. These were found on section to be filled with pus. Some of the smaller pockets of pus were dilated calices; some were abscesses of the renal tissue communicating with the pelvis. There were some yellow spots which had not broken down. There were also yellow streaks running from the pelvis to the surface of the kidney. In the pus, with which the pelvis was dilated, were many small calculi, and one of the size of a large bean, conical in shape, the smaller end lying in the beginning of the ureter. The ureter was slightly enlarged.

The bladder contained a little muco-pus, a few minute calculi, and one stone of the size of a hickory nut, but flattened.

The brain and its meninges appeared to be normal.

On examination of the spinal column, the spinous processes of the sixth and seventh cervical vertebræ were found to be absent. The laminæ of the seventh were also absent, their place being taken by firm fibrous tissue.

To this fibrous tissue and to the bony parts of the canal in the immediate neighborhood, the membranes of the cord were firmly adherent. After removing the cord there was found to be a slight dislocation forwards of one of the vertebral bodies. The membranes of the cord were at this point thick and firm, adherent to each other, and to the vertebræ. The cord itself was, however, for an inch or two of its length, broken down into a creamy fluid.¹ Above and below, the cord was firm, the lower part of the cord seeming to be harder than normal. Above the softened part, the columns of Goll were distinctly gray, and below, a portion of each lateral column was gray.

The vertebræ, from the neighborhood of the injury, and the cord were preserved for further examination.

¹ Compare with condition at date of operation.

EDITORIAL ARTICLES.

ON STENOSIS OF THE TRACHEA AFTER TRACHEOTOMY FOR CROUP AND DIPHTHERIA.

The difficulties and dangers, experienced in so many cases, on attempting, after the primary disease has subsided, a removal of the canula from the trachea, in which it has remained for some time, are well known to many. These have recently been considered in a series of papers published in the *Deutsche Medicinische Wochenschrift*, 1885, by Dr. Wilhelm Fleiner of Heidelberg. Chief among these are the sudden attacks of asphyxia, etc., which occur at this period. Fleiner regards these as caused by a contraction of the lumen of the trachea, appearing under certain conditions after tracheotomy in cases of diphtheria. Until 1884, the literature on this subject contained but some 50 cases of stenosis of the trachea after tracheotomy, and these with 6 cases coming under the personal observation of the author, in the Heidelberg clinic, together with 15 cases recently reported by Mensel, Hupeden, Parker, Passavant and others, form the total number, from which conclusions may be drawn. A reliable percentage of cases of tracheotomy with or without stenosis is, owing to the conflicting reports and differences of opinion, hardly possible. B. Lindner reports 103 cases of tracheotomy, 38 with recovery, among which were 3 with stenosis. Simon had one case of stenosis in 12 cases of tracheotomy, and Krönlein one case of stenosis out of 65 cases of recovery. Of the 103 cases of tracheotomy performed in Heidelberg from January 1877 to July 1880 (surgical clinic), 57 recovered, and among the latter number were 4 with stenosis. The author, in describing the condition of the mucous membrane of the trachea at the period when the diphtheritic process is healing, calls attention to the constant state of irritation to which the wound is subjected by the presence of the canula,

acting as a foreign body, and also to the infection to which it is exposed by direct contact with the diseased tracheal membrane. The canula exerts considerable pressure on the cartilage of the trachea, which, being elastic, has the constant tendency to resume its natural shape. But this being prevented by the presence of the canula, a bulging of the lining on the posterior wall of the trachea takes place, (Carié). This bulging fold is crescent-shaped (Passavant) and protrudes into the lumen of the trachea, more or less, according to the size of the canula. It disappears in most cases after the canula has been removed. There is, however, a tendency to infiltration and new-tissue-formation about the edges of the wound, if the canula be retained too long, resulting in fixation of the cartilage rings in this position and causing this bulging of the posterior membranous wall to remain.

Dangerous obstructions to breathing may be also caused by the proliferation of granulation-tissue on surfaces denuded by diphtheritic ulcerations, etc., so-called granulation-stenosis. Fleiner illustrates this by the history of an interesting case, where sudden death was caused by such obstructions. The submucous interstitial tissue in the upper portion of the trachea, near the vocal cleft, being less firm in its construction than that lower down, inflammatory infiltration takes place more easily; whence the greater danger of cricotomy and superior tracheotomy. Whether or not the cartilage of the trachea is directly affected by the diphtheritic process, has not as yet been determined, but the author considers that the strictures, so often observed after epidemics, would indicate a certain loss of elasticity in the cartilage, rendering it less able to withstand cicatricial retraction. This seems to be the opinion also of Neudörfer, who was the first to call attention to a shrinkage of the cartilage. Demme is of the same opinion. Be this as it may, it is certain that a flattening of the trachea anteriorly may follow a withdrawal of the canula, especially if the incision has been made too large, and chiefly when the patient is reclining on his back, (Passavant). In this position, namely, the trachea is elongated, and the anterior wall being much stretched, it yields more easily at the place of incision, where less resistance is offered.

Stenosis may be caused also by hyperplasia of the cartilage, as observed by Gerhardt and Heine, the latter in the form of "concentric hyperchondrosis" in cases of syphilis. It is probable, however, that in certain cases, simple thickening of submucous tissue has been mistaken for hyperplasia of the cartilage. The author found but one case of the latter mentioned. The trachea was 7 mm. in thickness, its lumen being so small that only a female catheter of 5 mm. diameter could be introduced. It is important to know that stenosis of the trachea may be furthermore brought about through the false position of the cartilage-rings, severed in tracheotomy. If, namely, the incision be too small for the canula, the edges of the cartilage-rings will be bent inwards, when this is introduced. If the canula be not soon removed, the edges will be retained in this position, owing to inflammatory infiltration. In some cases the elasticity of the cartilage may correct this, but in most cases we find the ends, often denuded of membranous covering, pointing inwards into the lumen of the trachea.

Strictures of this kind are often complicated and made worse by the presence of the membranous fold on the posterior wall alluded to above. In a case of the author's the stenosis was of this kind and so great that inferior tracheotomy was necessary. It will be seen, therefore, that the canula plays a large part in the production of stenosis.

Acting as a foreign body, it not only causes a permanent state of irritation, but this may be greatly increased when the canula does not fit properly, is badly constructed, with sharp lower edges, incorrect curvature, etc., all of which cause lesions in the walls of the trachea, and eventually decubitus. Fleiner says the usual points of decubitus are : (1) On the posterior wall, corresponding to the greatest convexity of canula ; (2) on the anterior wall, corresponding to the end of the canula ; (3) on the posterior wall, also corresponding to the end of the canula, when the latter is too short. Such decubitus heal readily if early enough detected, and properly fitting canulas be used. Völker says of Trousseau's canulas, that they are constant causes of granulation-stenosis by their uneven pressure on the trachea walls. The upper inner, and lower outer angles of the tracheal wound are usually free from pressure, and on these places granulations often develop to great size.

Trousseau, Millard and Barthez recommended frequent and early changing of the canula, in order to accustom the patient as soon as possible to dispense with its use. An interesting case, showing the importance of this procedure, is given by Bouchut. Pat., boy, æt. 13, had undergone tracheotomy for croup, six years before, and had always worn a canula since then, as he could not bear its removal on account of violent dyspnœa, as soon as this was attempted. The canula used, however, was the smallest number made, too small to serve for the purpose of respiration. Patient breathed freely through his mouth, spoke loud and clearly. Canula acted simply as a foreign body in the trachea, pressing down by its curvature and weight, a mass of granulations on the mucous membrane below the fistula. Without this pressure, this mass rose up and obstructed respiration more than the canula did. In this case and in one of Uhde, where the canula was worn for forty years, the cause of stenosis would not support the theory of Pauly and Völker, who maintain that continued use of the canula caused stenosis in their cases.

The author believes that the continued use of a canula is caused, in many cases, by a stenosis of the trachea, and not the stenosis by the long use by the canula. Trousseau's rule, namely, that the sooner the canula is removed, the better the result, may be in general a good one to follow. Still, in some cases, this may not only be detrimental, but even dangerous. On the whole, it will be found advisable to remove the canula only then, when the patient is able to breathe past the closed canula, and to breathe and speak freely through the window. This is generally between the fifth and ninth day, often, however, later.

It will be seen then, to recapitulate, that stenosis may arise from: (1.) granulating wound surfaces. (2.) swelling etc. of the mucous membrane, (3.) loss of elasticity in the cartilaginous walls, (4.) displacement of the divided cartilage rings.

These exuberances of granulation tissue are found mostly at the place of the tracheal wound, sometimes, however, lower down in the trachea, at a point corresponding to the lower end of the canula. They are of different form, some being bulb-shaped, others curtainlike with a granulating, rough surface. They often become œdematous, forming a ver-

itable vesicle obstructing respiration. They appear singly and in masses, and differ much in size. Koch observed in one case five granulomata. Complete closure of the trachea may result from the union of two granulomata, lying opposite each other. Cases of this kind are reported by Steiner, Weber and Roux. Cicatricial retractions of the mucous membrane of the trachea, causing strictures, have nothing especially characteristic, but resemble closely those of other canals. A stenosis of the trachea may also follow retraction of extratracheal cicatrices, acting on the cartilage and compressing the trachea, (Simon). The symptoms which arise on removing the canula when stenosis is present, are modified more or less, according to the seat and nature of the latter. The worst and most alarming symptoms are observed in cases of stenosis caused by loosely suspended granulations. Under certain nervous conditions which affect the circulatory system, these granulomata alter very much in size. Numerous cases, recorded in the literature on this subject, in which sudden mental disturbances, such as fear, anger, etc., have lead quickly to asphyxia and death, show that these granulomata became enlarged through an increased circulatory condition, owing to these psychical influences. Such cases were observed by Gigon, Calvet, Bouchut, Krishaber, Pauly, Bose and others.

These granulomata, when the canula is removed, fluctuate during respiration, and often become lodged in the larynx, causing complete or partial obstruction to breathing. The author considers this a more plausible explanation for those sudden attacks of asphyxia on attempting to remove the canula, than that based on a vaso-motory change in the granuloma through psychical influences, although he does not deny that the latter are often the cause. In many cases, when the removal of the canula has been followed by these attacks of dyspnœa etc., the effect on the patient is such that he strenuously resists all similar attempts. In nervous and irritable children, even where no objective symptoms exist, according to Sanné, a certain spasmodic condition, dependant on the fear of suffocation, hinders the removal of the canula. Sanné, Millard and Schmidt record cases of this kind. In a number of cases these alarming symptoms appear much later, at irregular periods, oftentimes months after the removal of the canula. Their sudden ap-

pearance may be due to increased respiration after violent physical exertions, psychical excitements, etc., and may be furthermore favored by catarrh of the air passages. Regarding a diagnosis as to the seat of the stenosis, much might be said. This may be sometimes localized by the maximal intensity of the stenosis—murmur heard all along the trachea. At other times the depression of the soft parts during inspiration, or an asymmetry or deformity of the trachea, gives the clue. In some cases, owing to the absence of objective conditions, it may be questionable whether the trachea or larynx is the seat of stenosis. In the latter case, the voice is changed or quite absent. Trélat calls attention to the fact that in stenosis of the larynx, phonation is first altered, whereas in stenosis of the trachea, respiration is first affected. Owing to the fact that the patients are mostly young children, a laryngoscopic examination is hardly possible. A thorough inspection of the cause of the stenosis will be advisable as soon the latter has been localized. Strictures of the trachea have not the treacherous character of the granulation stenosis, since, owing to their slow development, the organism may accustom itself gradually to their presence, and severe and alarming symptoms only appear when the lumen of the trachea has become much reduced in size.

The plan of treatment will depend largely on the possibility of making a diagnosis of the existence, seat and character of a stenosis. Granulations may be removed by excision, caustic means, etc. Great care should be exercised in using the latter. In order to prevent recurrence, a continued use of caustica will be advisable, or mild adstringentia inhaled or insufflated in powder form. Fleiner gives the history of a case in which Paquelin's thermocautery was used with complete success in the removal of these granulations. When cicatricial retraction is present with a stenosis, dilatation of the narrowed part will be indicated. This is best accomplished in a gradual manner by means of bougies, etc., introduced either through the mouth or the fistulous opening in the trachea. Such bougies as those of Dupin's and Roser's larynx dilator, are the best, as these allow enough space for respiration while lying in the trachea. When the trachea has been dilated to about its normal size, the aim of further treatment should be to maintain this and to pre-

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vent the recurrence to which all artificially dilated parts are prone for a long time. Trousseau and Dupins have both constructed canulas for this latter purpose. The high degree of sensibility of the mucous surface of the larynx and trachea, renders all attempts at dilatation through the fistula almost impossible without narcosis. This is also often the case when undertaken through the mouth. Strictures situated below the fistula are more easily treated through this latter opening, than those lying above it, as dilating instruments are more easily introduced. For the treatment of a stenosis lying far below the tracheal opening, and which results mostly from decubitus, there are a number of specified instruments. The existence of such a decubitus may be early detected by the bloody sputum, cough, fœtid breath, etc. and should be treated prophylactically. This is best accomplished by a changing of the canula. The fresh canula should be either longer, reaching beyond the affected spot, or shorter than the old one. If another canula be not attainable, a piece of rubber tubing drawn over the end of the old canula, will accomplish this purpose. The double canula of Robert is particularly efficient in such cases of deep lying stenosis. Similar ones have been constructed by Gendron, Trousseau and Demarquay. If, however, no satisfactory result be attained by this mode of treatment, or if the stenosis show the tendency of returning, an operative interference is certainly indicated. Division of cicatricial bands, as in internal urethrotomy, will be necessary in most cases on beginning a treatment of simple dilation, if this is to be successful. Operative treatment would consist in external incision of the trachea analogous to that employed in strictures of the urethra. Simon was the first to undertake this mode of treatment in 1868. He divided the trachea at the point of stenosis, downwards, and the larynx upwards to the middle of the thyroid cartilage, introduced the canula in the lower angle of the wound, and attempted, after the internal and external cicatricial bands had been severed, to obtain by suturing union of the mucous membrane of the trachea with the cutis. The result was but a temporary one. Schuller and Bruns favor this external incision, especially in stenosis of the larynx. After the stenosis has been divided it will be found useful to introduce Passavant's T shaped canula.

One great advantage in this method of treatment lies in the possibility afforded of making a thorough examination of the anatomical conditions present. Wegner and Heine have operated in cases of stenosis of the larynx with success. In some cases inferior tracheotomy is said to have had a beneficial effect on a granulation stenosis lying higher up. This is, perhaps, explainable by the fact that the diversion of the air current through the canula may cause a shrinkage of the granulations, the latter being no longer subjected to the irritation of the air-current and increased inspiratory movement. In a case of the author's, however, this desirable effect was not produced. As this operative treatment is, in some children, a matter of serious consideration, the author has constructed an instrument, the use of which was to render the former unnecessary. It may be applied as soon as a stenosis in the neighborhood of the fistula, has been diagnosticated, and which will not yield to simple treatment by caustica, etc. This instrument resembles in its form and size the T shaped canula of Dupins, and is made of metal. To enable its introduction through the fistula, it is composed of three separate parts which are held together by a screw. These three parts are grooved, and when placed together form the tube. By means of the screw the tube lying in the trachea is gradually enlarged until the definite width of the trachea is reached. Fleiner has only used his instrument in three cases, and with but partial success. He recommends furthermore in such cases, Passavant's three part canula.

In conclusion, the author considers at length the question as to whether and how far we are able to prevent by prophylaxis, the development of a stenosis after tracheotomy. As long as we are not able, he says, to control diphtheria, we are powerless to prevent the development of a stenosis arising from diphtheritic ulcerations. On the contrary, however, we have seen that under certain conditions, tracheotomy may be the cause, later on, of a stenosis, and it is very important to recognize these conditions and to avoid them. As the greater number of stenoses arise in the region of the cricoid cartilage, the author advises strongly against incising this. Great care should be taken in the selection of the canula. This should always have a window on the convex side, placed so that its central point lies in the

long axis of the lumen of the trachea. The exact diameter of this latter should be taken at the height of incision before introducing the canula. In this manner the proper size of the canula can be determined, and the irritation to the mucous membrane, caused by ill-fitting instruments, avoided.

C. J. COLLES.

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL
SCIENCE AND ITS SURGICAL RELATIONS.

MICRO-ORGANISMS AND SUPPURATION.

Since the chapter on suppuration in general (page 150 of this volume) was written, a most valuable contribution to the questions there considered has come to hand, being a prize-essay furnished by George Klemperer, an undergraduate clinical student of the Berlin University, and published in the *Zeitschrift für klinische Medicin*.¹ The prize had been offered by the faculty in the hope of obtaining some further knowledge leading toward the definite solution of the vexed questions as to the relation of micro-organisms to suppuration, and the contribution under consideration may unhesitatingly lay claim to have elucidated some of the most important points of interest in these questions.

Under the heading above referred to it was concluded from the experimental evidence (Passet), that larger quantities of chemical irritants could produce suppuration even when no bacteria were present; though Scheuerlen had proved that minute quantities (four drops) did not do so. In the present aspect of the subject, however, we are justified in declaring that there can be no suppuration whatever without micro-organisms.

Klemperer considered the precautions taken by previous experimenters (Uskoff, Orthmann, Councilman, Passet,) to prevent the entrance of germs into the tissue-cavity containing the injected chemical substance, to be uncertain and inadequate. He, therefore, adopted a method formerly used by Straus, of Paris, in 1883, consisting in the

¹ Die Beziehung der Micro-organismen zur Eiterung. Gekrönte Preisarbeit. Vol. X. Pp. 158-187.

use of actual cautery to insure the disinfection of the skin and parts surrounding the place of puncture. After producing an eschar of about $2\frac{1}{2}$ centimetres in diameter with Paquélin's cautery he introduced the canula of the sterilized syringe through the eschar beneath the skin and again occluded this puncture opening with the cautery as soon as the injection was completed. Rabbits, guinea-pigs and mice were thus experimented upon, and the substances injected were, of course, perfectly sterilized. Only in three cases the experiments failed, and pus containing micrococci was found. In all the rest—and a great number were performed—no sign of suppuration was observed, but only inflammatory symptoms were found, occasioning slight serous discharges, or, when potent chemical irritants (oil of turpentine, croton oil, mercury) were used, necroses of the tissues ensued, of the anatomical character of Weigert's coagulation-necrosis. The theorem may be, therefore, considered established, that micro-organisms are the cause of all suppuration.

We subjoin an abstract of the paper as given by the author himself.¹

1. More or less grave errors can be pointed out in the experiments of such authors who claimed to have produced suppuration after injections of irritant chemical substances with exclusion of micro-organisms. Their results are therefore not correct.

2. Injections of alkalies, organic or inorganic acids never produce suppuration, if micro-organisms be excluded.

3. Cantharides, ol. sinapis, petroleum produce violent inflammation, but no suppuration.

4. Croton oil, oil of turpentine and mercury are to be considered as producing the most intense inflammations. Injection of small amounts of these substances produces serous inflammation, if micro-organisms be absolutely excluded.

5. Larger amounts of oil of turpentine and croton oil in oily solutions, and mercury, produce coagulation-necrosis (Weigert) and fibrinous inflammation.

6. Injections of large amounts of turpentine and croton oil in alcoholic solutions produce serous inflammation, on account of the more rapid absorption.

¹ Centralblatt für Chirurg. 1885. No. 51.

7. Only in case micro-organisms enter under the skin after injections of turpentine, croton oil, and mercury, does suppuration occur. Micrococci can be observed in the pus in these cases, and they may be artificially cultivated, if they be inoculated into the soils before they lose their vitality.

To these results of his experience the author adds the following theoretical deductions :

8. Suppuration is occasioned by a quantitative as well as a qualitative alteration of the inflammatory process. The quantitative difference consists in the increased extravasation of white blood-corpuscles, as well as in the tendency of the process to spread, and in the general disturbance of the system frequently observed. The qualitative alteration consists in the purulent exudate remaining fluid, although all the substances necessary to the formation of fibrin are at first undoubtedly present.

9. Both these alterations in the character of the exudate in purulent as compared to other inflammations, are to be accounted for by the vital characteristics of the micrococci :

(a.) Quantitative alterations. The increased emigration of leucocytes and the general disturbance of bodily function is to be explained by means of the phlogogenic or poisonous secretions or products of the cocci. The progressive tendency is due to the advance of the cocci along the vessels, etc.

(b.) Qualitative changes. The fact that the pus fails to coagulate is occasioned by the want of fibrinogenic substance (one of the three generators of fibrin). This substance is probably converted into peptone by the cocci. That the latter can peptonize certain fluids has been proved as well as that pus contains peptone.

These latter considerations (Nos. 8 and 9) will, of course, be considered only in the light of ingenious hypotheses,¹ which future investigations will establish or refute. But it is not probable that the maxim advanced in this paper that micro-organisms are the cause of all suppuration will be again called in question in future.

¹ The idea that peptone plays a part in purulent inflammation has been suggested by Landerer. Cf. this journal. Vol. II. P. 485.

Weigert¹ and Councilman² have previously pointed out that since the introduction of chemical irritants into the animal body does not occur outside of the pathological laboratories, it suffices for all purposes of practice to say that no suppuration occurs unless through the action of micro-organisms. This theorem is therefore not altogether new. But still, as long as we are under the necessity of explaining the toxic effects of septicæmic poisoning, etc., by means of hypothetical products of the micro-organisms, it appears natural to ascribe the phenomenon that pus does not coagulate, not so much to the mere presence of the micrococci in purulent inflammations, but to some chemical product of their vitalistic energies, which may possibly some day be artificially compounded in our laboratories, as Friedländer points out,³ after the cultivation-soils of such micrococci have been properly submitted to chemical analysis.

If we, however, accept the dogma that there can be no suppuration without micro-organisms, we must attribute all so-called eliminating suppurations, as in cases of necrosis, to the presence of micro-organisms as well, and not to mere lifelessness of tissue. This it appears natural to do since we know that osteomyelitis, acute periostitis, etc. are actually caused by micrococci. If no micro-organisms are present the necrotic portions of bone, etc., are absorbed, and dead tissues disappear by regressive metamorphosis without suppuration.

It might be objected that cold abscesses are known to contain no micrococci. But the chronic inflammatory conditions which lead to cold abscesses are all of a closely allied nature, and contain, if not micrococci, tubercle-bacilli—even though the latter have not always been found in the pus.⁴

As to the forms of micro-organisms found by Klemperer in his experiments, he distinguishes three kinds according to the effects which they produce. One kind is said to occasion only inflammation, another suppuration from the first, while a third variety possesses the property of converting existing inflammation into suppuration.

¹ Fortschritte der Medicin. Vol. I. P. 661.

² Virchow's Arch. Vol. XCII. P. 217.

³ Fortschritte der Medicin. Vol. IV. P. 35.

⁴ G. Geisler, Jahrb. f. Kinderheilk. Vol. XXIII. P. 37.

MICRO-ORGANISMS AND HEALTHY TISSUES.

The question whether micro-organisms are not sometimes present in healthy tissues has likewise been again thoroughly investigated in an experimental work by G. Hauser, of Erlangen,¹ with the result, which was to be expected after Koch's researches on the same subject, that micro-organisms do not occur in the tissues of healthy animals.

In our article on sepsis (page 321 of this volume) reference is made to the experiments of Rosenberger, Rossbach and Zweifel, who concluded that micro-organisms were present in healthy tissues. Hauser commences his article by refuting these views and separately demonstrates in detail how they all are based upon experiments performed with insufficient antiseptic precautions, which are therefore not convincing.

The experiments consisted principally in procuring substances prone to fermentation as parts of organs, blood, urine, etc., in a pure condition and preserving them unfermented for long periods of time, simply by protecting them from infection, by means of simple cleanliness (sterilized apparatus), not by disinfectants. He preserved the substances in rarified air, in atmospheric air filtered through cotton, in hydrogen, oxygen, and carbonic acid gas, in water, and in various artificial culture-soils, all under the most favorable conditions for putrefaction—but without any such action occurring. In this manner he could positively prove that living tissues of animals contain no bacteria or germs of micro-organisms whatever; since it is well known that the slightest contamination with substances containing such microbes makes it impossible to preserve organic matter from fermentation and putrefaction. Besides the observation that living tissues contained no micro-organisms the author found that the preserved organs in time underwent a sort of regressive metamorphosis similar to that which takes place in the body in the absence of micro-organisms, and, what is of especial interest, that the products of such processes of resolution possess no poisonous properties whatever.

W. W. VAN ARSDALE.

¹ Ueber das Vorkommen von Micro-org. im lebenden Gewebe gesunder Thiere Arch. f. experiment. Pathol. u. Pharm. Vol. XX. Pp. 162-202.

INDEX OF SURGICAL PROGRESS.

GENERAL SURGERY.

I. Deaths from Anæsthetics in 1885. By ERNEST JACOB, M.D. (Leeds). Twelve cases are reported of death from chloroform, of which four were for trivial surgical manipulations; one might be considered rather a death from the exhaustion of a prolonged operation than from the direct action of the anæsthetic, while in another a large aneurism of the innominate artery might have precipitated a fatal result at any previous moment.

Three cases of death from ether, one where given for reducing a dislocation of the shoulder in a man, æt. 62, with fatty heart, emphysematous lungs and bronchitis; in the other two no autopsy having been made, no pathological data are available.

No deaths are reported from mixtures of chloroform and ether, from methylene bichloride or any other anæsthetic.—*Brit. Med. Jour.* 1886. March 13.

II. A Case of Re-Injection of Blood During Amputation at the Hip-Joint with Rapid Recovery. By A. G. MILLER, M.D. (Edinburgh). In a case of strumous disease affecting both hips, the left knee and the left elbow, with a large abscess connected with the left hip, the patient being in very feeble condition, amputation at the latter joint became necessary. The limb having been exsanguinated to the middle of the thigh, and a powerful elastic tourniquet applied at the groin, a rapid circular cut was made right down to the bone in the upper part of the thigh, the femur sawn through, the femoral artery and some smaller vessels tied, and the tourniquet removed; some hæmorrhage still occurring from a few small vessels, they were also ligatured. All the blood which escaped, both from the femoral artery and the smaller vessels, amounting to eleven ounces,

was caught in a vessel containing a solution of phosphate of soda and re-injected into the deep femoral vein. By an incision on the outer side of the thigh the head of the femur was then dissected out. The wound was dressed antiseptically. The patient suffered no shock whatever, nor depression of temperature after the operation. For the first few days, he was flushed and had a fuller pulse than before the operation, but he had no rise of temperature. The weakness and the anæmia of the patient, together with the increased vascularity of the parts due to the disease, rendered it very likely that he would not have survived the operation, had not the greater part of the blood lost been re-injected—the fact being that from the exsanguification of the leg, together with the reinfusion, there was probably an ultimate gain of blood after the operation.—*Edinburgh Med. Jour.* 1886. February.

J. E. PILCHER (U. S. Army).

NERVOUS AND VASCULAR SYSTEMS.

I. Cases Illustrating the Treatment of Contusions of the Larger Arteries. By H. R. WHARTON, M.D. (Philadelphia). Reports two cases of contusion, respectively, of the femoral and brachial arteries. The first occurred in a man, æt. 34, with a lacerated wound of the thigh; pulsation was absent from the arteries of the leg, and the femoral artery was contused and filled with a firm thrombus for several inches, beginning about one inch below Poupart's ligament; there had been free hæmorrhage apparently from the external circumflex artery. The femoral was ligatured in the sound tissue on either side of the contusion, divided between the two ligatures and the parts cleaned and drained; collateral circulation was established in good time, but on the seventh day a slight secondary hæmorrhage was observed and controlled by pressure, and on the day following, profuse hæmorrhage occurred, for which the distal end of the artery from which the ligature had come away, was ligatured, but ligature of the femoral vein was necessary before the bleeding could be controlled. The patient reacted slowly, and gangrene of the affected limb appeared the next day, rapidly spreading upward to the abdomen and resulting in death thirty-six hours after the last operation. The second case was a con-

tusion of the right elbow, and, at the time of admission to hospital, no pulsation could be detected in either radial or ulnar arteries. Under warm water dressings the temperature was improved, and in a few days arterial pulsation had returned at the wrist. On the eleventh day, great pain was evinced, and gangrene of the part appeared, spreading rapidly. The arm was consequently amputated on the same day, through the tuberosities of the humerus, and the patient made good recovery. Examination showed the brachial artery and vein matted together by a mass of lymph, their calibre practically obliterated by the results of inflammation, in and around their coats, and the vein containing a recent clot, the cause doubtless of the gangrene. The writer considers that in ordinary contusions, the injured part should be placed at rest, and, if the blood supply is found deficient, the temperature of the parts below the injury should be maintained by the application of external heat, to favor as much as possible the rapid establishment of the collateral circulation. Inflammatory lesions may be treated by evaporating lotions. Under this plan, recovery may occur with complete or partial obliteration of the artery at the seat of injury, if the collateral circulation, both arterial and venous, is satisfactorily established. Traumatic aneurism or gangrene may require amputation.—*Med. News.* 1886. March 27.

II. On the Operative Treatment of Popliteal Aneurism.

By T. ANNANDALE, F.R.C.S.ED. (Edinburgh). Remarking that compression is usually tried before operative measures the writer expresses a preference for digital compression or the application of an Esmarch's bandage immediately below the aneurism, with pressure by means of a horse-shoe tourniquet upon the femoral artery at the groin; from time to time the tourniquet is loosened slightly, so as to allow some blood to flow into the sac, and is immediately tightened—the treatment being carried on for from two to three hours at a time, an elastic bandage being applied, but not so as to stop the circulation in the limb, after the tourniquet and Esmarch's bandage are removed. Upon the failure of compression or when a case is unsuitable for it, ligature of the femoral artery or amputation, when certain local conditions or complications exist, are the usual resort; but he advocates the "old"

operation by laying open the sac and securing the artery at its point of communication with it, under antiseptic precautions, in preference to the ligature in (1) cases of large aneurisms filling up the space, and interfering by pressure with the venous and other circulation of the limb below, or causing serious nerve pressure, (2) rapidly growing aneurisms, which have attained some size, (3) ruptured and diffused aneurisms, (4) aneurisms which have involved the knee-joint by pressure, (5) aneurisms attacked with inflammation and suppuration, (6) aneurisms which the ligature of the femoral artery and compression have failed to cure, (7) arterio-venous and other aneurisms of traumatic origin, (8) cases of general arterial disease, provided surgical interference is necessary or advisable. In such of these conditions as are of an acute nature the operation must not be delayed, and symptoms of gangrene necessitate amputation. His method of operating is, after controlling the circulation in the limb by a tourniquet about the thigh, to open into the sac, and turn out the clots; a bougie is then passed into the artery at its opening into the aneurismal sac; through the wall of the sac, on either side of and above the opening, are made two small incisions, through which and under the artery with its contained bougie, the aneurism needle, armed with its antiseptic ligature, is passed, and the ligature drawn through and tied about the vessel upon the bougie, which is gradually withdrawn as it is tightened. Should there be only one opening, as is the case in a very large number of instances, the same proceeding is carried out upon the distal opening of the artery, the bougie being inserted into the opening again and passed downward; if there are two openings, they must be treated separately.—*Edinburgh Med. Jour.* 1886. February.

JAMES E. PILCHER (U. S. Army).

III. Destruction of Portion of Axillary Artery by Sarcoma. By Mr. W. S. SAVORY. Man, æt. 33. A large sarcoma in axilla. While removing it a severe hæmorrhage occurred and was controlled by pressure forceps. The patient lived for a week, and then died from a violent hæmorrhage. The post-mortem showed that the part of the artery involved in the tumor was completely broken up. The substance of the arterial wall was infiltrated with sarcomatous

growth. The internal coat was converted into a thin elastic membrane, and in places had given way, so that the growth presented free in the lumen of the artery.—*Lancet*. Dec. 12, 1885. P. 1094.

IV. Ligature of Sub-Clavian Artery for Axillary Aneurism. By Mr. BENNETT MAY. Man, æt. 60, chainmaker, formerly a publican. Aneurism of right pectoral and axillary regions. Skin over tumor thinning at one or two points. Double aortic murmur. The subclavian was ligatured with catgut, and the wound did well. The tumor contracted and hardened. The patient had, however, been drinking beforehand; he developed delirium and died of exhaustion on the eighth day. Post-mortem examination showed that the process of cure was well established. The author discusses the subject of treatment at length.—*Lancet*. Oct. 3, 1885. P. 613.

V. Observations on the Surgical Diseases of the Vascular System. By Mr. JOHN DUNCAN (Edinburgh). The author referring to the confusion of nomenclature in designating the varieties of vascular tumor, submits the following classification :

Angioma	{	Cirroid Aneurism	{	Aneurism by anastomosis
		Cavernous Tumor		Arterial erectile tumor
				Capillary erectile tumor
		Nævus		Venous erectile tumor.

Cirroid aneurism he reserves for the purely arterial tumor: cavernous and erectile to indicate growths whose analogue is the cavernous tissue of the penis. Nævus he takes to be a clinical term designating the congenital variety of capillary metamorphosis. Referring to treatment of cirroid aneurism, Duncan claims that he was the first to suggest the use of electrolysis and to carry it out twenty years ago. Excision is successful but very dangerous.

Aneurism by anastomosis is a tumor in which arteries, veins and capillaries are all involved. It increases slowly and irregularly, has little tendency to ulceration, and has risks in regard to rupture somewhat similar to but not so great as those of varix. The *arterial erectile tumor* is one in which the cavernous metamorphosis of the capillaries is associated with ectasy of the arteries and arterioles which

supply it; but in which the veins are not notably involved. It sometimes originates in congenital nævus. The *capillary* erectile tumor consists wholly of altered capillaries in which there is no pulsation or bruit nor marked venous dilatation cutaneous or subcutaneous. The tissue consists of blood spaces with free and large intercommunication, the trabeculæ composed of white and glistening connective tissue lined with an epithelium continuous with that of the blood vessels. It is supplied by arteries which, if they be enlarged, are so only immediately before they enter the tumor, and the veins which issue, if dilated at all, soon assume their normal calibre. In the *venous* form while undoubtedly telangiectasis or capillary metamorphosis exists the chief feature of the disease is phlebectasis or dilatation of the veins. There is greater tendency than in the others to inflammatory reaction, to ulceration and to possible hæmorrhage.

The author advises electrolysis in the smaller pulsatile tumors. He will try in a suitable case the subcutaneous application of the galvanic cautery when electrolysis fails.—*Edinburgh Medical Journal*. Nov. 1885. P. 401.

The reporter has seen his colleague, Mr. Thornley Stoker, use the thermo-cautère of Paquelin with admirable effect in large venous erectile tumors.

WM. THOMSON (Dublin).

VI. Arterio-Venous Aneurism. By Dr. F. BRAMANN. (Berlin). B. has attempted to present, if not quite a complete, at least a fully representative collection of these cases. The first exact description of this trouble was given by W. Hunter.

Besides imperfect reference to various other cases, he gives tabulated extracts of 13 affecting the head, 14 between carotid and internal jugular, 10 between subclavian or axillary vein and artery, 63 between the brachial vessels, one between abdominal aorta and common iliac vein, one between common iliac artery and vein, 36 of the femoral vessels, 16 of the popliteal vessels or their branches, and one of the retinal vessels. He also adds a new case between the vessels in the left axilla.

As to causes, 108 arose from stabs, blows or cuts—of these 56 fol-

lowed phlebotomy (3 on the temple, 53 on the arm)—29 from shot wounds, 6 from contusions, (5 without any wound, 1 from an abscess, 1 from amputation stump, 1 from an amputated spermatic cord in an ox), 4 without stated cause, and 9 spontaneously, while 4 were congenital—doubtless cirroid aneurisms.

As to symptoms, the primary hæmorrhage, external or perivascular, is in no wise characteristic. The first most constant and positive sign of a communication is the buzzing murmur. This is in some cases observed immediately after the causal accident, more rarely not until later, even after a period of years. The murmur is characterized, in contradistinction to aneurismatic and other vascular sounds, by being continuous; it increases, however, at each systole and then fades into a gurgling hum. To the touch there is a peculiar buzzing and vibration (thrill, *frémissement*).

These symptoms are at first slight and localized, but as the trouble increases they are more extensive; on the leg, however, they rarely extend above Poupart's ligament. The murmur is transmitted centrally as well as peripherally, while other sounds of vascular origin are transmitted only in the latter direction.

Not less characteristic is the venous pulsation, though this may not be so easy to distinguish in the early stages, and where the vein lies deep or beside an artery. Like the murmur the pulsation is strongest at the point of communication.

It is sometimes possible to close the opening by pressure, when, of course, the venous pulsation disappears, that in the peripheral branches of the artery increasing.

B. gives some sphymographic tracings showing a pronounced arterial character and contrasting with the only other known curves from this trouble, those of Ebenan. He points out that the peculiarities (anacrotism and broad apex) in E's. were doubtless produced by the proximity of the crural artery.

The consequent distention of veins in any given seat of the trouble is shown to depend on the anatomical peculiarities.

In B's case (operated by Von Bergmann) he was fortunate enough, just previous to the operation, to be able to measure the pressure di-

rectly with a manometer. Normally this amounts in the branches of the brachial vein to about 9 mm. of mercury. Here in the central end of the vein it rose to 56 to 64 and in the peripheral end to 87 to 90 mm. (the patient being allowed temporarily to come out of the narcosis), a pressure almost equal to the norm in the radial or ulnar artery. He casually cites a measurement of the pressure in the ulnar artery in a patient operated by Bergmann for aneurisms of that vessel; in deep narcosis it was 58 to 69 mm., but in this condition the pressure sinks nearly one-half, hence the corrected normal pressure in the said vessel he estimates at 116 to 130 mm. This greatly reduced difference between the local venous and arterial pressures accounts for the stasis in the corresponding capillary tract. The stasis is, of course, far greater if the affected part hangs down or is dependent, when it leads to so called "local asphyxia," oedema, etc. A further consequence of this is the lowered temperature of the limb. In a case published by K. Bardeleben and one by Kneek, this difference between the temperature of the two hands amounted to 6° to 8°; in Bra-mann's case 4° to 5°, rarely 6°. Theoretically, and in point of fact, everything that diminishes the stasis—work, vertical suspension, etc.—raises the local temperature. However, in the axilla affected, the temperature was constantly 2° to 3°, at times even 5° higher than on the other side. The lowered local temperature is felt by the patient, and there is greater sensitiveness to cold. In addition to this, and doubtless owing particularly to the inactivity, a feeling of weakness, easy exhaustion, numbness and creeping is perceived in the affected member. Actual sensory or motor disturbances, however, occur only where there has also been some nerve injury.

These growths may preserve a constant size or be progressive, or remain many years unchanged and then enlarge rapidly. Their size may form an impediment to the free motion of the part; oedema, weakness and atrophy of the muscles, obstinate eczemas and ulcerations, rupture of the sack, if in the region of the neck, then cerebral and respiratory symptoms, etc., are more or less frequent consequences.

The various methods of treating arterial aneurisms have also been applied to this form. Of all the bloodless methods of treatment—ex-

pectant, general depressive, by ice, digital compression (direct and indirect), instrumental compression, galvanopuncture, injection of coagulating solutions, etc., digital compression shows the best results. Its successes, however, have been chiefly in fresh cases near the elbow.

Ligature of the artery central to the communication has also its objections. Nutrition of parts peripheral to it will still suffer, and gangrene may develop; hæmorrhage or pyæmia has frequently followed; then a collateral circulation often develops and the original trouble somewhat diminished appears again. Far more favorable are the results from ligature above and below the aneurism; but most favorable is double ligature with extirpation of the intermediary enlargement. Of nine cases thus operated all were cured, seven of them, however, under antisepsis. In eleven cases amputation was resorted to, either for primary cure of the trouble or after other operations, with six cures and five deaths.

Various other operative methods are referred to. Operative treatment may be contraindicated by general affections of the vascular system.—*Arch. f. klin. Chirg.* 1886. Bd. 33. Hft. 1.

W. BROWNING (Brooklyn).

HEAD AND NECK.

I. Hernia Cerebri Treated by a Silver Plate Closing the Opening in the Skull. By DR. MACLAREN (Carlisle). At the London Clinical Society on March 12, Dr. M. read an account of a man æt. 26, with a compound fracture of the skull, from which ten fragments of bone were removed, leaving an aperture three inches long and varying in breadth from one inch above to half an inch below. "It was three-quarters of an inch in front of and parallel to the left temporal ridge, and its lower end was at the supra orbital ridge. Some brain which had protruded was removed and some diffuent brain gently syringed away." The accident occurred on March 25, and on April 14, Dr. M. removed a hernia cerebri which had occurred, placing a silver plate (a rolled out florin) inside the skull so as to block the opening. On May 3 the hernia cerebri again existed owing to the

plate slipping to one side within the skull. The protrusion was cut off and this time the plate so secured with wire that it could not be thrust to one side. The scalp was sutured over the plate. The latter was left in for two months, no protrusion occurring, when it was removed and the wound soon healed.

The right side was paralysed when the patient first came under treatment. When discharged from the hospital on September 5 there was slight dragging of the right leg, absolute paralysis of the right arm, and slight want of expression on the right side of the face. Partial aphasia. During the latter part of his stay in hospital he had two fits and has had several since, mostly at night, and always with an aura. The author pointed out the very small amount of local irritation caused by the plate, which did not exercise any pressure on the brain but merely replaced the normal covering.—*Lancet*. March 20. 1886.

C. B. KEETLEY (London).

II. The Mechanism of Indirect Fractures of the Skull.

By C. W. DULLES, M.D, (Philadelphia). Adopting the theory of Von Wahl that fractures of the skull may be divided into (1) crushing fractures, in which the line of fracture runs at right angles to the axis of the force applied; and (2) bursting fractures in which the lines of the fractures are parallel to the axis of the force which gives rise to them and which begin at some point in a line which, like the equator in relation to the poles of the earth, circumscribes the hollow figure in a plane equally distant from both points of compression. In compression of the skull which may be gradual, as in a vise, or sudden as when affected by a blow or fall, its elasticity comes into play while its diameter, which is parallel to the force applied, is shortened and its diameters which lie at right angles to this, are lengthened. The result is that indirect fractures run in meridional lines. As a result of an analysis of the experiments of Messerer, the writer concludes that (1) bursting fractures are more likely to occur at the base than in the vault; (2) force applied to the side of the head may be expected to produce a bursting fracture crossing the sagittal equator which is more likely to occur in the base than in the vertex; (3) force applied to the forehead or occiput may be expected to produce a bursting fracture

crossing the coronal equator; such a fracture is likely to occur in the temporo-parietal region and nearer to the base than to the vertex; (4) force applied to the vertex or base of the skull may be expected to produce a fracture at the base. These views he supports by an analysis of 119 cases of which 111 present fissures in accordance with the bursting theory, while only eight seem to contradict it. Subject then to certain modifications due to the structure of the skull, its coverings and contents, etc., he believes that when a sufficient force is applied to any curvilinear part of the skull, if this part does not give way immediately, the axes of the skull lying in the same line as that of the applied force is shortened; all the axis lying in planes at right angles to this line are correspondingly lengthened, with a proportional lengthening of their circumferences and separation of their meridians; so that the direct depressing force is converted into an indirect disruptive force acting at right angles to the direction of the former. The effect is to produce a fissure or fissures which will have a general meridional direction.—*Jour. Am. Med. Assn.* 1886. March 27 and April 3.

III. Gunshot Wound of the Head followed by Insanity, the Formation of a Cerebral Cyst and Recovery After Aspiration. By C. F. McDONALD, M.D. (Auburn, N. Y.) Reports the case of an insane convict, æt. 27, who had received a self-inflicted pistol shot wound of the skull about $\frac{3}{8}$ inch from the median line and $1\frac{3}{8}$ inch from the hairy scalp and, since that time has continuously displayed signs of aberration culminating in marked insanity on June 2, 1885, with clearly defined head symptoms. On the 7th, the depression in the forehead was exposed by Dr. Wells by a crucial incision, from which it was discovered that the opening in the skull was closed by fibrous, not bony tissue; in the expectation of finding an abscess cavity, the needle of a hypodermic syringe was thrust through this tissue in several directions until the barrel was found to be filling with a serous fluid, all of which was withdrawn to the extent of about two drachms. The wound was closed and dressed. On emerging from the anæsthetic the patient was found to have fully regained his mental equilibrium, in which condition he still remained five months later, the wound having been promptly cured.—*Am. Jour. Med. Sci.* 1886. April.

IV. Total Extirpation of the Tongue by Kocher's Method. By R. F. WEIR, M.D. (New York). A case of true epithelioma involving the right half of the tongue opposite the last molar teeth. The whole tongue having been found to be involved, it was drawn out and removed at the level of the hyoid bone after the side of the mouth had been opened by incision under the jaw. The patient was discharged cured 28 days after the operation. The operator considered the thorough carrying out of aseptic treatment a very important factor in securing this rapid result, and his modification of the "sticky" gauze of Billroth greatly facilitated it. His formula is: Resin, castor oil, alcohol, and iodoform in the proportion of 10, 6, 15, and 5 parts respectively, mixed together and applied to the gauze.—*Proceedings N. Y. Surg. Soc.* 1886. Jan. 12.

V. An Analysis of Seventy-Seven Cases of Tracheotomy. By R. W. LOVETT, M.D. (New York). Tracheotomy for pseudo-membranous laryngitis was done seventy-seven times at the Boston City Hospital in 1885 with twenty recoveries. Of the fifty-seven fatal cases, twenty-six died with symptoms of extension of the membrane to the trachea and bronchi, twenty-five with septic symptoms, four of heart failure during or after the operation and one each of pneumonia and peritonitis. Anæsthetics were not used in the cases of heart failure. In forty-four cases the operation was done on the first day of the croup, in sixteen on the second and in no case later than the third day. The average time of operation was the same in the cases that died and those that recovered, thirty-two hours after the onset of the croup. It was observed that in favorable cases the croup did not come on as rapidly as in the fatal cases. All the cases were treated as diphtheria. In the septic cases, tracheotomy was valuable as a means of euthanasia but totally failed in cases of extension of the membrane. Diphtheria of the wound was seen in no case. The systemic treatment consisted of small doses of mercuric bichloride with a milk diet with brandy.—*N. Y. Med. Rec.* 1886. April 3.

CHEST AND ABDOMEN.

I. Excision of the Pylorus for Carcinoma. By H. B. SANDS, M.D. (New York). In a man, æt. 31, sick for three years with dyspeptic and, later, cancerous symptoms traceable to the pylorus, an incision $3\frac{1}{2}$ inches long was made, with thorough antiseptic precautions, transversely over the pyloric extremity of the stomach, the various peritoneal reflections carefully separated from the walls of the stomach by the finger, all bleeding stopped, the pylorus enclosed between two sets of Rydygier's clamps, and the stomach cut through about an inch and a half to the left of the pyloric orifice; the pylorus and a small portion of the duodenum was then cut off with the scissors, the edges of the stomach wound were sutured together for about an inch and a half to two inches, and the duodenum stitched to the remaining orifice. Profuse bleeding followed the removal of the clamps, the employment of which caused delay such that in another case, the operator would depend on the fingers of an assistant. The toilet was performed with great care, the operation having lasted almost four hours. The patient died on the second day after the operation of asthenia. On autopsy, the cancerous infiltration of the stomach was found to have extended beyond the line of section.—*Proceedings N. Y. Surg. Soc.* 1886. Feb. 22.

II. Case of Laparotomy for Intestinal Obstruction With Recovery. By R. WINSLOW, M.D. (Baltimore). A colored woman, æt. 22, had had symptoms of intestinal obstruction for five or six days and, all efforts to produce defæcation having failed, laparotomy was done in a small and ill-ventilated bedroom, with corrosive sublimate antiseptic precautions; the incision was made in the linea alba two inches long, and afterward extended to six inches in length. A loop of ileum was found firmly adherent to the uterus and rectum, and, after the adhesions had been broken down, the seat of greatest constriction was found to have been about six or eight inches from the ileo-cæcal valve, at which point the bowel had been bent sharply upon itself. In separating the gut, its peritoneal coat was torn off in several places, and in one, where the intestinal wall looked weak, five Lembert sutures

were introduced. Peritonitis had not actually set in, although it was the opinion of those present that the patient could not have lived forty-eight hours longer. The toilet was performed with care, the abdomen closed and iodoform dressing applied. Reaction was good and recovery complete eighteen days later. Flatus and fæces passed respectively on the second and fourth day. In connection with this case, the writer refers to two recent unpublished cases of this operation, one of which was due to the adhesion of a loop of intestine to the pedicle of an ovarian tumor which had been successfully removed some weeks previously; the other was due to a strangulation of a small portion of the gut in the femoral ring, which produced no symptoms by which the seat of constriction could be located before opening the abdomen; laparotomy was performed, the incarcerated intestine released and the patient recovered.—*Am. Jour. Med. Sci.* 1886. April.

III. Enterotomy for Intestinal Obstruction from Impacted Gall-stone. By F. LANGE, M.D. (New York). A woman, æt. 60, had presented symptoms of intestinal obstruction for four days with vomiting and peritonitis and a history of previous attacks of impacted gall-stones. On explorative laparotomy by median incision, a gall-stone, $2\frac{1}{2}$ to 3 cm. in diameter, was found impacted in the small intestine; on longitudinal incision this escaped easily, the intestinal and abdominal wounds were closed promptly, but the patient died eight hours later of asthenia.—*Proceedings N. Y. Surg. Soc.* 1885. December 22.

JAMES E. PILCHER (U. S. Army.)

EXTREMITIES.

I. On Shortening by Operation the Bones of the Limbs in the Treatment of Injuries Complicated with Extensive Destruction of the Soft Parts. By Dr. MARTEL (St. Malo). Dr. Martel first conceived the idea that when extensive destruction of soft parts had taken place, it would be better to reduce the bones to a corresponding length by resection, than to rest satisfied merely with amputation, as long ago as 1882. He was then attending a suitable case, described in detail in the paper we are now noticing, but he was re-

strained from putting his idea into practice at that time, partly by the advice of a surgical friend, and partly by the untoward course of the case in question.

However, on June 2, 1885, a patient "B" æt. 32, was taken into hospital with a very severe compound fracture of the left leg. Anteriorly was a large wound whose extent was due to actual destruction rather than to retraction of the skin and subjacent tissues. The tibial fracture, oblique and not comminuted, was exposed in this wound, the ends overriding. The fibula was fractured in the middle.

The wound and its recesses were carefully washed with "strong" carbolic lotion, and afterwards, the limb was enveloped in a thick "*ap-pareil ouaté*." The immobilization removed all pain. Reaction was moderate, (on the third day, evening, temp. 39. 8.) Quinine for the fever; morphia and chloral for insomnia. Appetite returning. The remainder of the history is that of a suppurating, but not inflamed wound, with sloughs separating and cicatrization progressing up to February 25, (the fifty-fifth day of the treatment). On this day Dr. Martel resected about 75 millimètres of the tibial shaft, sawing obliquely both above and below. Much of the bone removed was necrosed. A corresponding portion of the fibula was removed through a separate opening. The two tibial fragments were sutured with a single stitch of thick silver wire, which does not appear to have held them very firmly together. The carbolic spray was used during the operation, and both during the operation and afterwards, the wound was carefully washed with "strong" carbolic lotion. Drainage with a large tube behind the fragment. Then carbolized charpie dressing and gutta-percha splints.

On March 25 it is noted that "the osseous segments are united, but the uniting tissue is flexible." On or about this date the silver suture was removed from the bone. On April 25 "consolidation appeared complete." June 8 a fenestrated, silicated bandage was applied.

August 3 "only two small lenticular" ulcerations remained which soon afterwards healed completely.

The amount of shortening was 7 to 8 centimètres. There was a good deal of stiffness of the ankle joint. But otherwise everything was sat-

isfactory; the limb was well shaped, and crutches and sticks were shortly discarded for a high boot.

The author is only cognizant of a single instance in which a surgeon was guided by an idea analogous to his own. In the *Centralblatt für Chirurgie* No. 50, 1884, Karl Loebker published a case in which, in order to facilitate apposition and suture of the ends of nerves and tendons, cicatrised and contracted after a transverse wound of the forearm, he resected portions of the radius and ulna. This operation was only moderately successful as regarded the ultimate results.

With regard to the question of what is the best time at which to undertake an operation like the author's, he points out that, until sloughs have begun to separate, it is not possible to be certain of the limits of destruction. After stating other considerations, he gives his opinion that the most favorable moment for resection is to be found between the tenth and twentieth day after the accident.—*Gaz. Med. de Paris*. 1886. Feb. 27, March 13 and 20.

II. Flat-Foot and the Construction of the Plantar-Arch.

By Prof. HUMPHRY, F. R. S. A lecture characterized by the author's masterly power of anatomical description. The first part is devoted to the normal structure and motions of the arches of the foot. It is followed by an account of a fresh dissection of a case of flat foot, and by the author's views of its causation and of the deductions as to treatment to be obtained from the pathology of the specimen described: "the only (osseous) deviation from the natural conformation" said to have been present, is described as follows: The convex anterior part of the astragalus below this rested in a preternaturally deep concavity of the scaphoid; and the inferior and inner part, thinly and unevenly covered with cartilage, was in contact with the expanded calcaneo-scaphoid and deltoid ligaments. By these changes in the form of the articular surfaces the ball-and-socket between the astragalus and scaphoid is deepened and lessened in area, and is surmounted by and continued into a flat or arthrodial portion, which restricts, and indeed almost prevents movements between the two bones." He considers these osseous changes to be a consequence and not a cause of the deformity. He notes that the alteration in the bones is of such a kin

as to prevent rather than favor a further increase of the deformity. "At the same time it would have been an obstacle to the return to the natural position, which, in so advanced and long-standing a case, and with such alteration in the articular surfaces, *could not have been effected without osteotomy*, if at all." The italics are ours. The author believes in the muscular and ligamentous origin of flat-foot. He sums up his views as to treatment thus: "In the early stages relief from weight and muscular exercise of the foot will effect a cure. In the later stages, especially if such bone-deformity as we have witnessed have taken place, nothing short of an osteotomy will do good."

Prof. H. lastly points out the "contracted and irritable condition" into which fall the muscles on the fibular and extensor side of the foot. He says that "this state is relieved by rest, especially if the rest is combined with extension by means of a well-applied splint; but it soon returns unless the treatment is continued for a sufficient period."

WOUNDS—INJURIES—ACCIDENTS.

I. Surgery of Gunshot Wounds of Knee-Joint. By Sir WM. MACCORMAC. The author, in describing two cases in which he lately removed bullets deeply imbedded in the condyles of the femur, with results practically perfect, observes: "Perhaps, after all, a gun-shot injury of the knee may not always be so disastrous as it was at one time assumed to be. Langenbeck told me he had met with at least one hundred cases of penetrating wounds of the knee-joint followed by recovery, during the Franco-German war. Many cases of recovery after a bullet had traversed the joint and fractured the bones are recorded by the Surgeon-General of the United States army; and then there are the remarkable results published by Bergmann and Reyher obtained after antiseptic occlusion in the Russo-Turkish and other campaigns. During the American war 338 cases of unmistakable fracture involving the bones of the knee-joint made good recoveries after an altogether expectant plan of treatment—that is, both life and limb were preserved. Many of the cases, besides the one which I have first quoted, are most remarkable, but for the details I must refer to the Surgeon-General's report. A conservative treatment, whenever

it is possible to adopt it, is probably by far the most promising one for gunshot injury to the knee-joint, and it has proved the most successful, especially in recent campaigns. Excision of the knee for gunshot injury in time of war has hitherto been disastrous, while amputation has been very fatal also.—*Lancet*. February 27. 1886.

BONES, JOINTS, ORTHOPÆDIC.

I. Chronic Rheumatic Arthritis of the Hip-Joint. By W. ADAMS. (London). In this paper, read at the Harveian Society, March 4, the author gives the following diagnostic table, contrasting the disease in question with Charcot's joint disease :

<i>Rheumatic Arthritis.</i>	<i>Charcot's Disease.</i>
1—Changes chiefly hypertrophic.	1—Changes chiefly atrophic.
2—Commences in the soft tissues.	2—Commences in the bones.
3—Painful throughout its course.	3—Generally painless.
4—Pain confined to the joint.	4—Pains shoot through the limbs.
5—No febrile disturbance; no gastric or ocular symptoms.	5—All these symptoms are present.
6—Reflex symptoms.	6—Reflex symptoms absent.
7—Limited mobility.	7—Flail-like mobility.
8—Progress slow and chronic.	8—Progress rapid and acute.
9—Patients often reach old age.	9—Patients seldom reach old age.

This apparently useful and complete table is, unfortunately, far from accurate. It may be justifiable to say that chronic rheumatic arthritis commences in the "soft tissues," because cartilage is certainly soft as compared with bone; but it is quite incorrect to say absolutely and without qualification that febrile disturbance, gastric and ocular symptoms are "all present," in Charcot's disease. There are many cases without gastric disturbance; it is more rare to find absence of ocular symptoms, nor are reflex symptoms necessarily absent. I have myself seen a woman with Charcot's disease of one knee and no other symptoms of tabes except the lightning pains; a man with Charcot's disease of the left shoulder and no ataxic symptoms whatever except, possibly, a contracted condition of one pupil, and another man with Charcot's disease of the knee, and not only complete ab-

sence of all other tabetic symptoms, but actually increased patellar reflex. And such cases cannot be uncommon except, perhaps, in the practice of physicians who usually, of necessity, see Charcot's joint disease mainly in patients they are already attending for ataxia, or gastric crises, or the like.

It should be borne in mind that it is the rule for tabetic arthropathies to come on early in the course of the general disease.

C. B. KEETLEY (London).

II. On the treatment of Old Dislocations of the Humero-Radial Joint. By Dr. SPRENGEL (Dresden). Isolated dislocation of the radius head, even when not reduced, frequently admits a fair degree of mobility. Hence its treatment is by many (e. g. Albert, König, Hueter) considered to have little more than theoretical interest. Löbker (1884) reported three cases in children of dislocation forwards in which he secured a good result as regards function by exsection of the radial head.

S. gives a case to show that in dislocation backwards exsection is not, or not always, necessary. The patient was a boy of 6 years. The accident had occurred five or six weeks previously. Arthrotomy of the humero-radial joint was performed through the fovea ovalis to free the capsule interposed between capitulum and ulna. The head of radius was reposed and the tear in the capsule sutured. The result was functionally unexceptionable.—*Centbl. f. Chirg.* 1886. No. 10.

W. BROWNING (Brooklyn).

III. On the So-called Subluxation of the Head of the Radius in Young Children. By Dr. E. HOFFMANN. The construction of the elbow-joint is so complicated, that in many cases of injury to this part, a diagnosis may be very difficult. The introduction of the antiseptic method in surgery has been of great value in this direction, as under its proper observance, resection may be successfully carried out, and all doubt concerning the nature of such injuries, in many cases, dispelled. This mode of treatment, however, would hardly be indicated in cases of so-called subluxation of the radius-head in young children. After a forced extension, mostly combined with pronation, the child lets the arm sink down as if lamed, symptoms

which disappear, however, as soon as reposition has taken place. These are the chief characteristics of this lesion. French authorities, chiefly among whom Goyrand may be mentioned, place the seat of this lesion in the lower radio-ulnar articulation, with a luxation of the head of the ulna or of the triangular cartilage. The author, however, considers that in the largest number of cases the superior radius articulation is the affected one, to which all the symptoms clearly point. The opinions concerning the nature of this lesion differ very much. Strubel, Koenig and others consider an interposition of the capsule to be the chief cause, this being relatively broad in children. Others, among whom are Roser and Albert, believe that a subluxation of the radius-head anteriorly takes place in these cases. In children the capsule being broad and yielding, and the cup-shaped depression of the radius-head very shallow, a dislocation of the radius-head anteriorly may take place without tearing the capsule. This subluxation is caused, doubtless, by forced pronation, says the author, but he does not think it has been sufficiently demonstrated, why the radius head should remain in this position, as if wedged there. These subluxations are caused generally by over-extension together with pronation, especially when the weight of the body is suspended by the arm. This is the result often seen, when children have been lifted by the arm over gutters, etc., by their nurses, or when strong traction on the arm has been made in pulling off a coat, etc. After the trauma has taken place, the child drops its arm as if lamed, and cannot be induced to move it. The hanging arm will be found pronated or in a position between pro-and supination, and is slightly flexed in the elbow-joint. Inspection and palpation will reveal nothing especially characteristic on the radius-head. Flexion is possible to a right angle, but further than this will be painful, as is also full extension. Supination is especially hindered. Certainty as to the true nature of the affection can be arrived at only when therapeutic measures are undertaken. For this purpose the arm is extended in supination and then flexed, while a pressure is made with the thumb in the region of the radius-head. At the moment of reposition a distinct snapping will be felt under the thumb. After reposition all movements of the arm will be found entirely free. A

bandage is worn for about eight days, the arm being placed at a right angle and in supination.

The author treated ten such cases during the past year, of which seven were girls. He thinks that perhaps this frequency in girls might be due to the conditions favoring this trouble, or the larger size and greater pliability of the capsule. The ages of his patients ranged from one to five years.—*Deutsch. Med. Wochenschrift*. No. 7. Feb. 18. 1886.

(For full discussion of this subject see memoir by Mr. J. Hutchinson, Jr., in *ANNALS OF SURGERY*, August, 1885. Vol. II. P. 91.)

C. J. COLLES (New York).

GYNÆCOLOGICAL.

I. High Amputation, Compared with Total Extirpation of the Uterus for Cancer. By W. H. BAKER, M.D. (Boston, Mass.) From ten cases, all operated upon upward of four years ago, with no deaths at the time of operation and sixty per cent well after the four years, supported by the results of later operations, the writer concludes that (1) high amputation should be practised in all cases of cancer of the cervix or of the cervix and lower part of the body of the uterus, in which any radical operation is possible. His plan is to remove the entire cervix with a conical portion of the body of the uterus, the apex of the cone being nearly or quite at the fundus uteri and the base at the level of the internal os. (2.) Kolpohysterectomy should be performed in all cases of cancer of the body primarily and affecting the cervix secondarily.—*N. Y. Med. Jour.* 1886. March 20.

II. Laparotomy and Pelvic Abscess. By A. R. JACKSON, M.D., (Chicago). Discussion by C. FENGER, M.D., H. T. BYFORD, M.D., and E. ANDREWS, M.D., (Chicago). Prof. Jackson details a case of pelvic abscess of about two months and a half duration, in which, by bimanual examination, he was able to get fluctuation and which seemed to be about to point in the vicinity of the symphysis pubis and laparotomy was decided upon to relieve the urgent symptoms. An incision three inches long, ending below at the upper portion of the

mons veneris, was made in the middle line of the hypogastrium. Deepening the cut, the peritoneum was found, which, however, could not be separated from the parts beneath. Proceeding inward through dense structures the knife suddenly entered an abscess cavity, which at once gave exit to a stream of pus to the amount of two or three ounces. By the finger passed through the opening, the cavity was found to extend downward, behind and to the left of the uterus, about three inches. The abscess walls proper could not be accurately defined, the inflammatory process having matted together the upper part of the uterus, the left broad ligament, tube and ovary. The cavity was irrigated antiseptically and drained well with a result of uninterrupted recovery. To his paper Dr. Jackson appends a note from Mr. Lawson Tait in which he states that he has operated for pelvic abscess thirty-two times with a cure in all cases.

Prof. C. Fenger called attention to the fact that Dr. Jackson's operation was not a true laparotomy, since he did not open into the abdominal cavity but through a mass of adhesions into an abscess cavity, which was as simple an operation as opening an abscess of an extremity. He then proceeded to a review of the literature of the subject, referring to the conclusions of Säger with regard to the etiology of pelvic affections, and those of Kœnig and Schlesinger with regard to the direction which inflammation travels in this locality; fluids injected into the region about the fundus uteri and uterine portion of the Fallopian tubes first pass upward into the iliac fossa to reach the crest of the ilium and then up the anterior abdominal wall or downward toward Poupart's ligament and into the true pelvis; fluids injected in the neighborhood of the internal os first fill the extraperitoneal connective tissue of the true pelvis, then follow the round ligaments as far as Poupart's ligament and ascend backward into the iliac fossa; when the injection is made near the lower portion of the posterior surface of the uterus, the fluid flows into the sac of Douglas and thence rises into the iliac fossa. Dr. Fenger approved of the treatment of these affections by laparotomy as a last resort, and objected to attacking them through the rectum except when near the anus, and especially reproached the use of the knife in this viscus.

Dr. H. T. Byford, while not disapproving entirely of laparotomy, discouraged its too frequent performance, and advocated opening abscesses which point in the rectum through that part of the gut, believing that any abscess which is truly pelvic and points in the lower four or five inches of the rectum, can be reached by dilating the anus. He believed that an abscess with a single opening into the rectum, properly made or enlarged, will close up more rapidly than if such a fistula has not been enlarged or if an abdomino-rectal fistula is created. Opening through the vagina is always the preferable procedure when practicable.

Prof. E. Andrews remarked that many cases recover spontaneously and that these less serious cases are not as likely to come under the observation of the specialist, and related two cases in illustration; he considered that operation should be delayed until the presence of a pus cavity is positively known, and related a case of circumuterine abscess for the relief of which several operations—not laparotomies—had been performed without effect, pus continuing to be discharged by abdominal and rectal fistulæ; after death by asthenia, on autopsy, an extensive burrowing fistula was found but no abscess cavity, although a flattened pocket of considerable size was found in the hollow of the sacrum behind the rectum, this could not have been reached by laparotomy.—*Proceedings Chicago Gynecological Society*. 1886. February 19.

J. E. PILCHER, (U. S. Army).

REVIEWS OF BOOKS.

FIVE HUNDRED CASES OF FISTULA, PILES AND OTHER DISEASES OF THE RECTUM. By SAMUEL BENTON L. R. C. P., M. R. C. S. London: Henry Renshaw. 1886.

This little book contains the details, conveniently arranged in tabular form, of a selection from a series of 512 cases of rectal disease which have been treated by the author. The chatty introduction of some seventeen pages which precedes the "raison d'être" of the book, is worth reading for the purpose of showing the practical views held by the author upon the subject to which, for some time he has been devoting special attention. For example, he is emphatic in his advocacy of the treatment of hæmorrhoids by ligature, and he claims that the method fulfils all the requirements of the operative surgeon. Some of the cases, of which particulars are given, lead one to infer that the treatment of rectal disease does not come as a "boon and a blessing" to a certain section of practitioners. There are some details which point to the fact. Case 453 on page 21, is thus described. "This patient suffered great pain for some time, had been under several doctors, *but had not been examined.* (The italics are ours). Again, case 481, a man admitted for fistula and who was discharged cured in seventeen days; "had consulted four doctors, and before admission had been treated for piles. Lastly, case 40, a man cured after nine days' treatment of fistula, was "seven years ago operated on by a well-known advertising doctor; three months afterwards this gentleman had to repeat his operation, and the second time he found a needle near the anus." Why are we not told more about this needle? It inspires the same amount of curiosity which the discourse of an antiquarian saw bone is wont to excite. Whence came it? History relates not. It is presumable, however, that at the time of its removal a greater antiquity could be assigned to it than that which three months would confer. But in the absence of precise information everything, of course, is mere conjecture.

There are some useful remarks anent the preparation of patients for, and the treatment of rectal operations, together with the all important

question of the treatment of hæmorrhage in these cases; and the book concludes with the record of a case, in full detail, of colotomy for cancer of the rectum.

H. PERCY DUNN.

TRANSACTIONS OF THE ACADEMY OF MEDICINE IN IRELAND. Vol. iii.

Edited by WILLIAM THOMSON, M. A., F. R. C. S. I.

The third volume of the transactions of the Academy of Medicine in Ireland consists of a compendious selection of papers which maintains the high standard which was the distinguishing feature of the preceding volumes of this series. The publication of these transactions possesses an importance which will be readily acknowledged, inasmuch as they afford a good reflex of the surgery which is practiced in the Irish capital, as well as throughout Ireland. The surgical section opens with a paper on melanotic sarcoma of the rectum by Charles B. Ball. The removal of the growth by the usual method was accomplished without difficulty, and the patient was not troubled with the least incontinence afterwards; a fact which lends some support to the opinion of J. O'Beirne that the rectum is normally empty except at the time preceding the act of defæcation. In some interesting remarks which accompany the case Ball refers to the extreme rarity of the disease in question, and draws attention to Virchow's observation that the rectum is the only portion of the intestinal canal in which primary melanotic sarcoma of the rectum has been met with. The disease, moreover, according to Virchow, whilst being extremely rare in the human subject, is somewhat commonly observed in the horse. Ball thinks that where linear proctotomy—an operation strongly advocated by Verneuil—is sufficient to overcome the obstruction in cases of rectal cancer, this procedure is much to be preferred to colotomy, because its performance exposes the patient to less risks, and the normal position of the outlet of the intestine is preserved.

The author has collected 175 cases of excision of the rectum; of these there was a mortality of 16. 5. p. c. In his opinion the operation of excision of the rectum is a thoroughly sound one, as tending to prolong life—and it may even be followed by a complete cure. The operation, he thinks, has been best described by Volkmann. (*Sammlung Klinische Vorträge*, May 13, 1878.).

The paper concludes by referring to the treatment of the peritoneum when this membrane has been accidentally wounded during the operation; the wound ought at once to be plugged with aseptic sponge, and after the removal of the disease the sponge is to be removed and the opening carefully closed with catgut.

The editor in a paper upon "three cases of ovariectomy," takes the opportunity of discussing the question of whether or not general surgeons should perform ovariectomy, or if on the other hand the operation should solely remain in the hands of practiced ovariectomists—a theory of which Mr. Lawson Tait is the most ardent supporter.

The arguments advanced in this paper against the opinion of Mr. Lawson Tait are most cogent, if not convincing. But, then, after all, there can scarcely be many persons who require to be convinced that ovariectomy comes as much within the domain of general surgery as lithotomy, internal urethrotomy or any other special operation.

Mr. H. R. Swanzy in a paper on the transplantation of skin flaps without pedicle for the cure of cicatricial ectropion, gives the notes of seven instances in which he has performed this operation, and, in some remarks upon the expediency of the procedure, points out that the wounded surface of the eyelid should be made as extensive as possible, in order to allow for the subsequent shrinking of the flap which is almost inevitable; that it is much better to do without sutures if possible, as they nearly always cause suppuration, but fine silk sutures are best if only applied in numbers sufficient to fix the flap; that carbolic acid dressing is a mistake, the best dressings, and lotions being of boracic acid, and sero-sublimate. There are two papers upon the treatment of flat foot, one by Mr. William Stokes in which the treatment by astragaloid osteotomy is advocated, and the other by Mr. Kendal Franks who states it as his belief that Ogston's operation will become established as the best means of dealing with those cases of flat foot which do not yield to palliative treatment inasmuch as the operation removes the deformity itself. Mr. W. I. Wheeler narrates in detail two cases, one of complete excision of the clavicle for osteo-sarcoma, the other of partial excision of this bone for necrosis. Both cases did well. The same surgeon has another contribution, viz: Upon resection of the humerus at the shoulder joint. In this operation he prefers the longitudinal incision through the deltoid muscles. Three cases are recorded, in each of which, a successful result was obtained.

Papers upon "Condylotomy by the Osteotome for Knock-Knee" by R. L. Swan; "Some Cases of Knee Surgery, by Mr. John R. Barton; the "Treatment of Stricture by Internal Urethrotomy," by Mr. William Thornby Stoker, complete the surgical section. In the pathological section there are several interesting papers, such as "Tar Cancer," by Dr. C. B. Ball; "Epithelioma of the Eyelid resulting from irritation by crude carbolic acid," by J. B. Story, and "Note on Tubercle of the Tonsils," by Mr. P. S. Abraham. In regard to the number of communications, this sec-

tion is by far the largest in the volume, and surgeons will find in it much which is worthy of record, and much which tends to maintain the high standard of the papers which have been selected to form the third volume of these transactions.

H. PERCY DUNN.

SURGICAL HANDICRAFT. A manual of surgical manipulations, minor surgery, and other matters connected with the work of house surgeons and surgical dressers. (223 illustrations). By WALTER PYE, F. R. C. S., Surgeon to St. Mary's Hospital, etc. Second edition. London: H. Kimpton.

We reviewed this book on its first appearance last year, and we have much pleasure in noticing that as regards the defects which we then pointed out, the author has, in the new edition, energetically set himself to put things right. We offer him our congratulations on the well-deserved success of his work, and we recommend it heartily to both students and practitioners.

C. B. KEETLEY.

Published Simultaneously in Great Britain and the United States.

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ANNALS OF SURGERY

A MONTHLY REVIEW
OF SURGICAL SCIENCE AND PRACTICE

EDITED BY

L. S. PILCHER, A.M., M.D.,

AND

C. B. KEETLEY, F.R.C.S.

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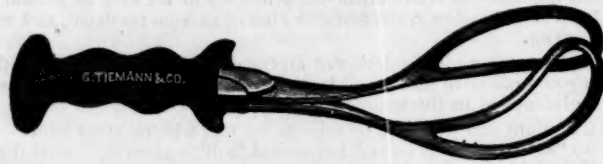
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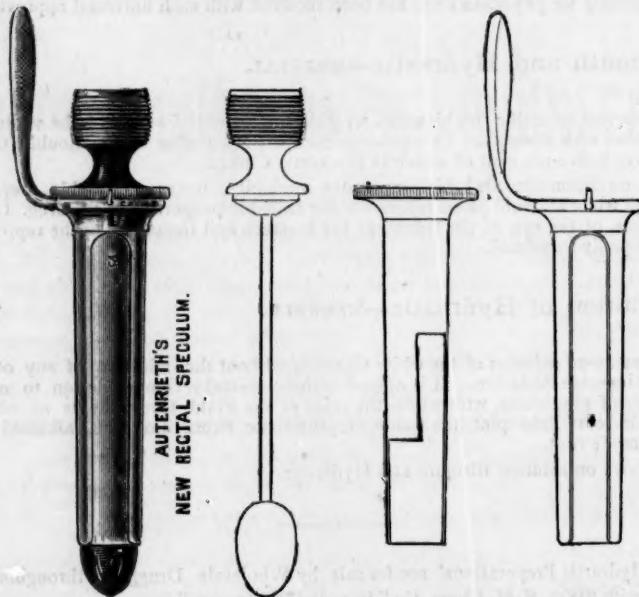
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